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No. I. OF VOL. II., 1926.
No. 5366. Vol. CCXI.

LONDON, SATURDAY, JULY 3, 1926.
Founded 1823. Registered as a Newspaper. Published Weekly.

Pp. 120—Price 1s.
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BY STANFORD CADE, F.R.C.S. ENG.,
ASSISTANT SURGEON, WESTMINSTER HOSPITAL.

RADIOLOGICAL diagnosis of the condition of the biliary tract has made a distinct advance by the development of cholecystography. Ewart A. Graham published in 1924 the preliminary report[1] of the method known as Graham's test, by which a radiogram of the gall-bladder is obtained after intravenous injection of certain chemical substances. Following the investigation of the hepatic function by its power of excreting certain dyes, first introduced by Rowntree, Hurvitz, and Bloomfield[2] in 1923, Graham conceived and carried out a systematic series of experiments for the production of hepatitis and cholecystitis; this led to the investigation of the gall-bladder by means of certain salts which are taken up from the blood stream by the liver and excreted in the bile, and which are opaque to the X rays when concentrated. In a series of papers published[3 4 5] in 1924 and 1925 Graham and his collaborators have gradually improved the technique of this method of investigation. The substance employed is one of the halogen elements linked with phenolphthalein. Iodine and bromine were found to be the most suitable halogens, and a comparison of the two was worked out by Whitaker and Milliken.[6] These workers, as well as Carman,[7] Sherwood Moore, and many others,[8 9] have put the method to clinical tests and correlated their results. The method has been eagerly tried by many clinicians, and papers by Cohen and Roberts[10] and by Wilkie and Illingworth[11] have been published recently.

In my experience the use of sodium tetraiodophenolphthalein gives the better results. The radiograms are much more distinct than those with the bromine salt. The toxicity is so low that, if the dosage is carefully regulated and the patient suitably prepared, no unpleasant symptoms result, with very few exceptions. Intravenous administration is vastly superior to the oral method if a good shadow is desired.

TECHNIQUE.

The preparation of the patient is important. The stomach must be empty and the alimentary canal as free from gas as possible. No food is to be given during the period the radiograms are taken. Protein is omitted from the last meal on the eve of the injection. 40 gr. of sodium bicarbonate are given two-hourly during the day. A maximum dose of 4·5 g. of sodium tetraiodophenolphthalein dissolved in 40 c.cm. of double distilled water is injected intravenously; the solution must be warm and injected very slowly. No ill-effects have been noticed from a single injection, but Graham[3] and Carman[7] advocate the administration of two equal half doses at a half hour's interval. The greatest possible care must be taken that the solution is given intravenously; the escape of even the smallest quantity into the subcutaneous tissue produces cellulitis and necrosis. Skiagrams are taken 4, 8, 24, and, if necessary, 36 hours later.

Normal Biliary System.

In cases where the biliary system is normal and the gall-bladder healthy a shadow is obtained three hours after the injection of the dye. The density of the shadow will vary with the softness or hardness of the tube and the length of exposure. With a correct radiological technique uniform results are obtained. The *size* of the shadow is always larger than the actual gall-bladder. It is largest four hours after injection and gradually diminishes in size. The *shape* of the gall-bladder shadow is generally pyriform with the base downwards, less frequently it is ovoid and rarely spherical.

Position of the Gall-bladder.

When full the fundus reaches, as a rule, the transverse process of the third lumbar vertebra, its upper extremity extending to the transverse process of the first lumbar or just below it. The long axis is directed downwards and slightly outwards, parallel with the psoas muscle. In narrow-chested individuals the position may be vertical; in cases with a wide thoracic angle it is more horizontal; the relation of the shadow to the twelfth rib is variable; most commonly it is well below it; not infrequently it is only a short distance from it, and at times at the level of the twelfth rib. A shadow above the twelfth rib is an indication of abnormality most commonly due to adhesions; the high-situated shadows are, as a rule, more spherical and smaller than the low ones; one can regard the small, round shadow situated between the eleventh and twelfth ribs, well away from the transverse processes, as an indication of cholecystic disease.

The gradual diminution of the shadow in the course of 24 hours is evidence of the normal elasticity of the muscular coat. In a fasting individual this diminution in size is gradual and regular, and takes place in all directions, the shadow becoming shorter and narrower.

It has been observed that the density of the cholecystogram increases from the fifth to the tenth or twelfth hour, and then gradually diminishes. This variation in density is an important feature; it indicates a normal and healthy mucosa and is a proof of the power the gall-bladder possesses to concentrate bile; the power of concentration is a normal function of the biliary vesicle and depends on the state of the mucosa. Rous and McMaster[12] have shown that the normal gall-bladder concentrates the bile which passes through it sometimes as much as ten times, and Boyd,[13] in examining the gall-bladder by means of a dissecting microscope, described in detail the appearance of the mucosa so admirably suitable for absorption. The gradually increasing density of the cholecystogram is in entire agreement with the conclusions drawn from those observations. The function of the gall-bladder is reduced to that of a mere reservoir only in cases where the mucosa has been changed by disease into a thin atrophied lining. In these cases there is no variation in the density of the successive shadows.

The dye as excreted by the liver is not sufficiently opaque to cast a shadow.[14] The ducts do not possess the property of concentrating the bile; on the contrary, it has been shown that they dilute the bile with a thin secretion of their own: this secretion, which is colourless and devoid of cholates, is the so-called "white bile" found in certain pathological conditions. Consequently, in cases of common duct obstruction, owing to lack of concentration, no shadow is obtained, although the gall-bladder is present and the cystic duct patent.

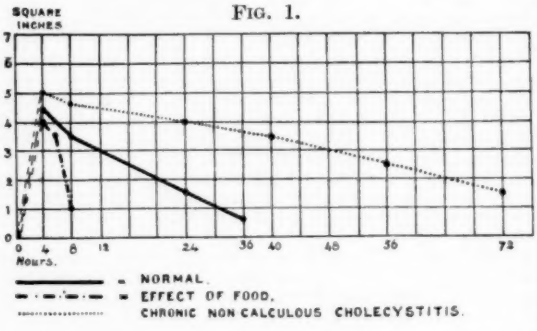
Rate of Emptying.

The difficulty of ascertaining the rate of bile flow from the gall-bladder in normal individuals and animals has given rise to contradictory statements. In observations on biliary fistulas one is dealing with an abnormal condition; this criticism applies even more forcibly to observations under anæsthesia; from clinical studies with the duodenal tube different observers have arrived at different conclusions. The visualised human gall-bladder casts an opaque shadow which, photographed at periodical intervals, gives a true picture of the variations in size during the period of opacity. The activity of the gall-bladder varies with intake of food. In fasting individuals there is a slow and progressive emptying of the biliary vesicle which is fairly constant. The size of the shadow becomes gradually smaller and is about one-third of its original size in 30 hours. This gradual emptying is a constant phenomenon in all normal gall-bladders observed. In mapping out the surface areas of the shadow in inches

and plotting out the figures according to the time elapsed since injection a graphic representation of the rate of emptying is obtained. The superimposed curves of over 25 normal graphic representations is taken as the average rate of emptying of a normal gall-bladder when fasting (Fig. 1).

The effect of food was studied, and it was noticed that water, milk, tea have very little influence on the rate of emptying. Solid food, specially fat, produces a rapid diminution of the size of the gall-bladder

FIG. 1.



shadow; the graph obtained under these conditions shows a sharp fall in the curve. Moreover, if the emptying is complete no further shadow is obtained, indicating that the intake of food is followed not only by emptying of the gall-bladder, but by increased activity of the liver and relaxation of the sphincter of Oddi, as most of the bile containing the dye is passed straight into the duodenum. It was also noticed that in two cases of duodenal ulcer the rate of emptying was more rapid; this is interesting in view of the remark recently made by Charles Mayo that "Nature has provided us in the gall-bladder with a natural soda fountain, very useful in hyperacidity."

CHOLECYSTOGRAMS IN CONJUNCTION WITH MELTZER-LYON TEST.

Doyon [15] in 1893 paved the way for the Meltzer-Lyon test in showing that the contraction of the muscular coat of the gall-bladder was dependent on its innervation by the great splanchnic nerve, and that the relaxation of the sphincter of Oddi was under the influence of the vagus. In 1917 S. J. Meltzer [16] observed that the application of 25 per cent. magnesium sulphate solution to the duodenal mucosa was followed by gaping of the ampulla of Vater and a flow of bile. Two years later Vincent Lyon [17] carried out Meltzer's experiment on the human subject and postulated the non-surgical drainage of the gall-bladder. The emptying of the gall-bladder after the intraduodenal exhibition of magnesium sulphate, known as the Meltzer-Lyon test, has been criticised by Einhorn,[18] Auster and Crohn,[19] Diamond,[20] and a host of others.[21] It was maintained that the flow of green bile (bile B) was due to the action of magnesium sulphate on the liver. Numerous complicated and ingenious experiments were carried out to prove that the dark-coloured bile obtained in the Meltzer-Lyon test was not vesical but hepatic in origin. Substances other than magnesium sulphate were found to produce the same effect. Lyon himself failed to observe the contraction of the gall-bladder in the anæsthetised dog, and explained the failure by the fact that the reflex was "easily disturbed." [22] Bassler, Lucket, and Lutz [23] failed to see the contracting gall-bladder. Gradually it came about that the gall-bladder was robbed by some authors of all power of contraction. On perusal of the rapidly increasing literature on this subject [24] one cannot fail to be impressed by the importance attached to the Meltzer-Lyon phenomenon. The combination of cholecystography with the Meltzer-Lyon test has the advantage that it is carried out without anæsthesia, without laparotomy, with very little disturbance of the reflex itself. It gives photographic evidence of a reduction in size and alteration in position of the gall-bladder shadow. And since non-surgical drainage of the gall-bladder with the appearance of a large amount of dark-coloured bile is accompanied by the alteration in shape and diminution in size of the cholecystogram, the bile obtained by the test must be vesical and not hepatic. Further, the bile B thus obtained showed to contain a large amount of tetraiodophenolphthalein (Fig. 2). Silverman and Melville [25] combined cholecystography with the Meltzer-Lyon test, and arrived at the same conclusions.

Chiray and Pavel [26] have analysed the various experiments, and conclude that the gall-bladder contractions exist, that they are of small amplitude and long duration, and therefore difficult to observe. My own experiments on dogs have shown distinct contractions of the gall-bladder after application of magnesium sulphate to the duodenum. I repeated the experiments in the presence of Dr. de Souza, who observed the same result.

In reviewing the various normal functions attributed to the gall-bladder cholecystography helps to transfer these functions from the realm of hypothesis to that of fact. The gall-bladder acts as a reservoir and stores bile secreted in between meals. The gall-bladder is contractile and expels its contents by waves of contractions of slow amplitude accelerated by the entrance of chyme into the duodenum. The gall-bladder concentrates bile. These various functions are deduced from the appearance of the opaque shadow, its increase in density, its gradual disappearance when fasting, and its quick emptying after food or with the action of magnesium sulphate.

PATHOLOGICAL BILIARY SYSTEM.

Cholecystography as an aid to clinical diagnosis of disease of the biliary system requires no apology. Although the diagnosis of a number of cases presents no special difficulty, it is notorious that the characteristic symptom of biliary disease is the lack of definite characteristics; and the mimicking of gastric and duodenal symptoms is a fruitful source of errors in diagnosis. Familiarity with normal cholecystographic appearances is obviously essential for the detection and correct interpretation of abnormal findings. The absence of shadow or negative result is a sign of disease. It has been accepted by all who are familiar with the method and has been proved time after time by operation.

A stone in the cystic duct or in Hartman's pouch, or scarring of the duct, prevents the entrance of the dye into the gall-bladder and no shadow is obtained. The information derived from cholecystography in that type of lesion is illustrated by the following case.

A lady, aged 73, was admitted under the care of Sir James Purves-Stewart for an abdominal tumour and gastritis. She had suffered from gastritis for 30 years; for the last two years there was progressive loss of weight, marked deterioration of general health, frequent bouts of vomiting, persistent constipation, and a constant dull ache on the right side of abdomen. On examination a large, hard, solid tumour was felt in the right hypochondrium and right iliac fossa. The tumour was at first thought to be renal, but a pyelogram showed normal calyces and pelvis; it was then considered to be a colonic growth—a bismuth meal showed a normal alimentary canal. I was asked to see the patient with view to cholecystography. The radiograms, taken 4, 8, 24, and 36 hours after injection, showed no gall-bladder shadow, and in the second plate a circular ringed shadow with darker nucleus became apparent. The diagnosis was gall-stones and cholecystitis with large Riedel's lobe. At operation under regional anæsthesia I found a large Riedel's lobe covering a bilocular gall-bladder adherent to duodenum, stomach, colon, and omentum; the proximal loculus contained a large stone in Hartman's pouch, the distal loculus contained multiple stones, and communicated by perforation with an abscess in the adherent omentum. Cholecystectomy was performed. The patient made an uninterrupted recovery.

Every case of obstruction of the cystic duct gave negative cholecystographic findings. In cases with obstruction of the common duct from whatever cause no shadow of the gall-bladder is obtained. Presence of

jaundice is no contra-indication for the administration of sodium tetraiodophenolphthalein.

I have investigated cases of common duct obstruction due to neoplasm of the pancreas with large easily palpable distended gall-bladders, and cases of calculus obstruction with shrunken atrophied biliary vesicles; in none was a shadow obtained. The conclusions drawn from the study of these cases controlled by operation or autopsy are that in obstruction of the common duct the gall-bladder function is abolished and its power of concentrating bile is diminished.

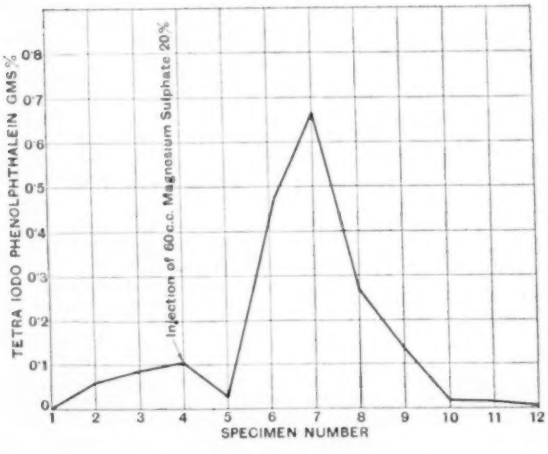
GALL-STONES.

The opacity of gall-stones to the X rays depends on their chemical composition. Pure cholesterin stones are so transparent that no shadow is obtained; calculi containing calcium are opaque, and the density of the shadow is in direct proportion with the amount of calcium salts present. Ringed shadows are very typical. The appearances of cholecystograms in cases of lithiasis without cystic duct obstruction depend upon two factors—the degree of cholecystitis and the number of stones. If the stones are so numerous as to fill the gall-bladder, or if there is marked cholecystitis, no cholecystogram is obtained. With fewer stones the shadow is of mottled appearance, and the stones become more opaque as the density of the shadow is increased. The mottling of the shadows is definite evidence of gall-stones. The usefulness of the method lies in the fact that gall-stones which are invisible in a preliminary radiogram, when immersed in bile containing the dye are outlined as negative shadows. Also some calculi, by absorbing the dye in sufficient amount, become visible in the skiagrams. Further, it is a means of differentiating gall-stones from shadows cast by glands, stercoliths, renal calculi, and phleboliths.

CHRONIC NON-CALCULOUS CHOLECYSTITIS.

This condition was first described by Keen in 1883, and since by numerous pathologists and surgeons. Clinically it may resemble gall-stone disease so closely as to merit the name pseudo-cholelithiasis; or the main burden of the symptoms may, on the other hand, be extravesicular. These extravesicular symptoms, predominant in the patient's account of his illness,

FIG. 2.



consist in gastric or intestinal disturbance, deterioration of general health, repeated migraine, and signs of toxæmia, which accounts for the frequent mistaken diagnosis. The vesicular symptoms are transient and obscured in the patient's mind by the more obtrusive general discomfort; they are present, none the less, and will be found if looked for.

The essential histological picture is the gradual replacement of all the layers of the gall-bladder wall by inflammatory fibrosis. The changes vary in degree according to the duration of disease. In the early stages there is round-cell infiltration of the submucosa, some shedding of the epithelium, formation of small diverticula containing bile grit, and a slight degeneration of the muscle; later on the mucosa degenerates and stains feebly, the fibrosis of the muscular wall is increased, and the subperitoneal stratum is beginning to be invaded with fat. In the late stages the columnar epithelium is replaced by a layer of flattened cells, or the mucosa may be absent altogether; the wall is thickened and no elastic and muscular tissue can be distinguished; the fat under the peritoneum is greatly increased.

The diagnosis, although not obvious, can be arrived at in combining careful clinical examination with cholecystography and the Meltzer-Lyon test. Cholecystographic findings are as follows. When the mucosa is grossly involved no opaque shadow is obtained. In lesser degrees the shadow is faint throughout; it does not vary in intensity and only slightly in size, and it conveys the information that the mucosa is incapable of concentrating the dye and that the elasticity of the viscus is lost—such a finding is a clear indication for cholecystectomy. In lesser degrees of disease the shadow is faint, and the rate of emptying is greatly diminished. This slow emptying, so apparent in consecutive cholecystograms, means biliary stasis; and the stagnation of bile is responsible for the symptoms produced. The importance of cholecystography in these cases lies not only in the aid in diagnosis but in the information obtained in connexion with the results of non-operative treatment and the progress of the case. The whole investigation can be done on out-patients; hospitalisation is preferable, but not essential. The following is the routine: a careful history of the case is taken, a preliminary radiogram obtained; after suitable preparation cholecystography by the intravenous method is done: if there is evidence of early chronic non-calculous cholecystitis the patient is given 5 g. of magnesium sulphate and 2 g. of De Witte's peptone, half an hour before breakfast and half an hour before dinner. This should not be given if there is obstruction in the cystic duct, as biliary colic may ensue.

Treatment is continued for 10 or 14 days, and is followed by a second cholecystography, which shows if drainage has been efficient or not. If successful the rate of emptying is found to be increased and the shadows obtained approach the normal; if the picture remains unaltered it is obvious that the non-surgical drainage by magnesium sulphate-peptone is of no benefit and operation is indicated.[27] By this method a few cases of early cholecystitis can be rationally treated by medical means and their progress controlled. Other abnormalities observed relate to the implication of the gall-bladder in adhesions, to changes due to pericholecystitis. As previously mentioned, they can be summarised as follows: a shadow high situated between eleventh and twelfth ribs spherical in outline and of poor intensity.

In examining cases which previously had cholecystotomy performed it was found that none gave a normal opacity: in some no shadow was obtained showing loss of function of the viscus, subsequently proved by operation; in others very poor shadows were obtained. Without entering into the consideration of the value of cholecystostomy as compared to cholecystectomy, and admitting freely that both operations have their indications and their uses, cholecystography gives important information as to the functional capacity of gall-bladders previously drained. It appears from the preliminary investigation that the recovery of function after cholecystostomy occurs only in cases of lithiasis with very little cholecystitis. When drainage was chosen instead of removal owing to operative difficulties caused either by the anatomical or the pathological condition at the time of operation, the recovery of function is very rarely established and sooner or later further trouble results. To quote Sir John Bland-Sutton: "A gall-bladder that has been subjected to a cholecystotomy is a liability rather than an asset."[28]

It can therefore be concluded that non-appearance of the shadow is definite indication of cholecystic disease. Mottling is evidence of gall-stones. Chronic cholecystitis gives definite abnormality in the cholecystogram. Cholecystectomy is indicated when the function of the gall-bladder is impaired.

Histological evidence of disease has been found in every case where the shadow was abnormal or absent. The surgeon will have to learn to distinguish from the appearance of the gall-bladder on laparotomy the early signs of disease in the absence of stones. I have removed 30 gall-bladders in the past ten months; my senior colleague, Mr. Arthur Evans, has given me the opportunity of examining every gall-bladder operated on by him during the past year—a considerable number—and I gradually came to appreciate the macroscopical appearance in the early stages of cholecystic disease.

ANIMAL EXPERIMENTS.

The object in performing animal experiments was to ascertain the following points: (1) The path taken by the dye from the time it is injected into a vein till it reaches the gall-bladder. (2) The way out from the gall-bladder. (3) The effect of sodium tetraiodophenolphthalein in various doses on the tissues and organs of the body. (4) The symptoms produced by an overdose. (5) The effect produced on the gall-bladder of magnesium sulphate in the duodenum. All experiments were carried out on healthy adult dogs.

In injecting the dye into a vein of a limb the dye is introduced into the systemic circulation. It is carried to the heart, whence to the lungs and back to the heart, and so into the arterial stream. It is presumed, as phenolphthalein is excreted by the liver, that in the course of the passage from the hepatic arteries into the hepatic vein the liver cells separate from the blood the phenolphthalein and with it the combined iodine. In fact the dye is found in the bile canaliculi and is carried down to the gall-bladder by the hepatic and cystic ducts. To prove this it is necessary to show that no dye can be separated by the gall-bladder itself from the blood stream. The following experiment was carried out. Laparotomy was performed on a fasting dog: the gall-bladder was found to be fully distended; the peritoneum over the cystic duct was incised, and the duct isolated by carefully separating it from the cystic artery and veins. The duct was then divided between two ligatures. The abdomen was closed and the dog allowed to recover. When well a maximum dose of sodium tetraiodophenolphthalein was given intravenously; seven hours after injection the abdomen was opened a second time; the gall-bladder was seen to be normal in every respect and its blood-supply unimpaired; the gall-bladder was removed and its contents tested chemically and spectroscopically for the presence of the dye with absolutely negative results, the reactions being capable of showing 0·00001 g. of the dye. A specimen of blood of the same animal taken at the same time showed on analysis presence of the dye; this shows that no dye has entered the gall-bladder and that the mucosa is incapable of separating it from the blood stream.[14]

The next experiment was made with the object to find out if any dye is absorbed from the gall-bladder by its blood-vessels or lymphatics. Laparotomy was performed. The cystic duct was isolated as before and divided between two ligatures, avoiding injury to its vascular supply. A measured quantity—namely, 2·5 c.cm. of the dye (0·281 g.)—was injected into the gall-bladder with a fine hypodermic needle. As it is known that the dye produces necrosis of tissue a small quantity only was given and this was well diluted. The abdomen was closed. The dog was X rayed two days later, but no shadow was obtained, probably owing to the minute quantity of the dye injected; seven days later the abdomen was reopened, the gall-bladder, which appeared normal, was aspirated and the contents analysed. The iodine content of the specimen showed the recovery of 84·1 per cent. of total salt injected, by weight 0·236 g. The small discrepancy in the figures is fully accounted for by the fact that not all the contents of the gall-bladder were aspirated, and that some of the dye remained adherent to the syringe. The mucosa of the gall-bladder appeared normal. The conclusion drawn from this experiment is that no sodium tetraiodophenolphthalein is absorbed by the wall of the gall-bladder, and that its disappearance is due to the ejection through the cystic duct.[2,9]

Gradually increasing doses of "tetraiodo" were given to dogs on several occasions. It was found that doses up to 0·2 g. per kilo of body-weight produced no toxic effect, and repeated injections of non-toxic doses at regular short intervals up to full dose had no apparent cumulative effects on the animals; but when killed fatty degeneration of the liver and nephric changes were found histologically. A large overdose, 5 g., given to a dog weighing 8 kilos, was followed by an immediate fall of blood pressure, and death occurred within 25 minutes. A dose of 3·5 g. given to a dog weighing 7 kilos resulted in death after 16 hours. The following symptoms were observed: weakness (animal could not sit), fall of blood pressure, diarrhœa, vomiting, and convulsions. Post-mortem examination revealed intense congestion of the liver and kidneys, these viscera being almost black; the heart was dilated; the bladder contained some blood-stained urine; the lungs were bright pink. Histologically the liver showed intense congestion, the intralobular veins were distended, the portal capillaries engorged; there were marked subcapsular hæmorrhages and areas of destruction of liver tissue were present in which were seen particles of pigment (probably altered blood); the kidneys were in a condition of glomerular nephritis; the brain was engorged and there was some fragmentation of cerebral cells.

The experiments with intraduodenal application of magnesium sulphate, as previously related, showed definite contractions of the gall-bladder. All the animal experiments were carried out at the Brown Institution, and I am indebted to the University of London for permission to work there, and to the Director, Dr. F. W. Twort, for his courtesy and the facilities afforded.

RECORD OF CASES AND ANALYSIS OF RESULTS.

Table I. shows the total number of cases examined, the relative numbers of positive and negative results, and the control by operation. Table II. gives the analysis of the various conditions which gave positive

TABLE I.—*Cholecystographies.*

(Total number of cases, 100.)

Positive results	61	
Negative results	39	
Controlled by operation		55
,, by autopsy		3
Not operated		42

TABLE II.—*Total Number of Cases, 100.*

Positive.		Negative.	
Normal gall-bladder	49	Cystic duct obstruction	16
Mottled shadow	6	Chronic cholecystitis	9
Cholecystitis	4	After cholecystectomy	3
Catarrhal jaundice	1	After cholecystostomy	4
Acholuric jaundice	1	Malignant gall-bladder	1
		,, pancreas	5
		Chronic pancreatitis	1
	61		39

or negative results. Amongst the 49 normal gall-bladders are included conditions such as gastric ulcer or appendicitis, where the appearance of the gall-bladder was subsequently judged to be normal at operation.

The vast majority of cases were done by the intravenous method, and showed no ill-effects after the injection. The dose varied from 3 to 4·5 g., according to the weight of the patient. The only symptoms noticed in a small number of cases were: headache, flushing of the face, giddiness, transient nausea; within 10 or 15 minutes the patient had entirely recovered. There is no evidence up till now of any remote consequences attributable to the use of the drug. In two consecutive cases severe toxic

symptoms followed intravenous injection; the symptoms occurred within one or two minutes after injection, and were as follows: giddiness, headache, nausea, vomiting, sudden fall of blood pressure (the pulse at the wrist could not be felt for half to three-quarters of an hour), and acute abdominal pain. The symptoms were very alarming; recovery was gradual but complete, and both patients were fit to leave the hospital five hours later. I have reason to believe that the toxic effect was partly due to a too rapid injection and partly to oxidation of the iodo compound. The necessity of slow administration cannot be emphasised too strongly; the salt itself must be absolutely pure and as fresh as possible. With these precautions and attention to the accuracy of the dose and preliminary preparation I consider the method as an absolutely safe procedure.

Oral administration never gives as good results as the intravenous method; it gives also far less information as regards function of the gall-bladder, as the shadow appears much later, lasts a shorter period, and is never as dense as that obtained by the intravenous injection. In my opinion oral administration presents definite inconvenience, and it cannot be said to be safer. The drug has to be given in solid form; as contact with hydrochloric acid produces a definite chemical reaction, it is customary to give it in capsules; enteric capsules have been tried and discarded owing to delay of solution; ordinary gelatin capsules often fail to liberate the dye and small masses of the drug can be watched under the fluoroscopic screen in their transit through the alimentary canal; the rate of absorption is extremely variable and, owing to the laxative action of the phenolphthalein, a good deal of the dye is lost; this accounts for the poor shadows obtained and the unstability of results. A negative result after oral administration is therefore of no value; on the other hand, after intravenous injection is definite evidence of disease. The loss of the salt by the bowel cannot be made good by giving a larger dose orally, as the stomach and intestine do not tolerate it and vomiting and diarrhœa result; this explains why the advocates of the oral method never exceed by the mouth the intravenous dose, and often give less. The advantage of oral administration is simplicity, but for this method to be of full value it is necessary to give a substance which is rapidly absorbed by the intestine, is non-irritant to the mucosa, and non-toxic, so that a much larger dose than is necessary to produce a shadow could be given to allow for the loss by passage through the alimentary canal. Sodium tetraiodophenolphthalein does not possess these properties, neither does strontium bromide advocated by some Italian clinicians. Dr. F. D. M. Hocking, however, is at present engaged in the preparation of a chemical compound which one hopes will fulfil the necessary desiderata for oral administration.

Summary.

Cholecystography is a new method of investigation of the biliary system based on the capability of the liver to excrete certain dyes opaque to the X rays.

It is a means of studying the topographical anatomy of the gall-bladder in the living; it throws light on the physiology of the gall-bladder, on its activities under various conditions, and on its multiple functions. In disease it provides additional information in late and in early stages. It is a means of controlling the non-operative treatment of chronic cholecystitis.

It is not meant to replace clinical diagnosis, but adds greatly to its accuracy. It is to the biliary system what the opaque meal is to the alimentary canal, and pyelography to the urinary tract. It has made rapid advances in a very brief period of time and has gained for itself, I believe, a permanent position amongst modern methods of investigating disease.

In conclusion, I have much pleasure in expressing my obligation to all those who collaborated with me in this study. To Dr. W. H. Coldwell I am indebted for all the radiological and radiographic work, and for the willingness with which he placed at my disposal his entire department, his time, and his skill. To Mr. Arthur Evans my thanks are due for his whole-hearted and encouraging interest in the method, his unstinted generosity in the matter of hospital beds, and for giving me the opportunity of investigating cases of biliary disease under his care. In the John Burford Carlill laboratories the pathological work connected with this investigation was carried out by Dr. Braxton Hicks, who examined all specimens, human and animal, and the biochemical work was done by Dr. Hocking; to both I am greatly indebted. To Mr. Price Thomas I wish to express my appreciation for the valuable assistance with the animal experiments and the clinical part of the work.

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An Address

ON THE

HEALTH OF PROFESSIONAL WOMEN.

Delivered to the London Association of the Medical Women's Federation on June 8th, 1926,

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MODERN social and economic developments have brought important changes in the lives of women which necessarily have involved profound effects on their health. These results have been much discussed, and in the case of the *industrial* woman have been made the subject of intensive study from which she has derived substantial benefit. The *professional* woman is much less accessible to observation, and the exact data which are a condition precedent to advance in hygiene and success in the prevention of disease are deplorably lacking. With the exception of the comparative statistics furnished by the post office about its employees, and a few small inquiries conducted in training colleges, a paper on the Sickness Data of Elementary School Teachers in London, 1904–19, by Mr. J. Y. Hart, B.Sc. (*Journal of the Royal Statistical Society*, 1922), stands almost alone as a detailed study. I have therefore ventured to present some observations on the health of profes-

sional women, based on a series of 900 consecutive cases of teachers referred to the school medical officer on account of absence for over a month, and for sundry other reasons, and supplemented by a knowledge of the same staff at their daily occupation over a period of 12 years. The number of teachers concerned is 13,748. They make good material for study, as their conditions of pay are sufficient to procure reasonable amenities of life and the best of medical and dental attention, and they have derived, by reason of their profession, the maximum benefit from modern hygienic propaganda.

COMPARISON OF SICKNESS RATE IN WOMEN AND MEN.

An important point about the health of women generally must be borne in mind throughout, and that is the higher sickness rate which women always show as compared with men living under approximately the same conditions. I have been unable to obtain comparative figures for recent years for London, but Mr. Hart points out that "sex is the most important factor in illness of teachers. The mean illness of men teachers was 4·6 days a year for the period 1904–19, and the corresponding figures for single women and married women are 8·2 and 9·3 respectively. Men are absent least and married women most."

The following table shows:

Average Day's Absence per annum, London, 1904–19.

Age groups	Men.	Single women.	Married women.	Age groups.	Men.	Single women.	Married women.
21–25	4·3	6·4	11·1	46–50	4·0	10·9	9·7
26–30	4·1	6·9	8·5	51–55	5·5	15·1	11·7
31–35	2·8	8·6	7·1	56–60	5·8	10·4	13·1
36–40	2·8	8·7	8·2	61–65	9·2	19·1	19·6
41–45	3·5	9·1	9·0				

This fact is the more remarkable as the death-rate of men and women shows a disparity in exactly the opposite direction. As Newsholme points out ("Vital Statistics," p. 205), the death-rates at all ages except 10–15 are higher in the male. This discrepancy is most marked both in England and the United States at the very ages, 45 to 65, when the sickness rate is most against the female.

The London rates for death and permanent invaliding show the same peculiarity. The death-rate of female teachers (1925) was 0·25 per cent., as against the male rate of 0·44 per cent., while the permanent disablement rate was 0·40 per cent. for females and 0·27 per cent. for males.

It would appear that in some paradoxical way women save themselves from death by becoming ill! But however gratifying the comparatively lower death-rate is to them, the higher morbidity rate is a nuisance to their employers, and it will be very important to note whether any part of it is due to remediable causes and could be diminished by improved conditions of life. The difference affects *every* disease, however, when short absences are counted, and would appear to be partly due to inferior resistance.

ANÆMIA AND DEBILITY.

Anæmia and debility figures prominently in all certificates covering short absences, but in only 1 per cent. of 900 serious cases was it impossible on investigation to find any more definite cause. It is three times as common as among men teachers. The vague "unfitness" thus described interferes considerably with the efficiency of women's work. Lack of exercise, fresh air, and sunshine are common causes in young town-dwellers, but another common cause of debility is too long a journey to work. Some women stand long daily travelling very badly, and improve greatly if they live near their work, and get what fresh air they can at the week-ends.

Diet gets less attention than it deserves in conditions of obscure ill-health. "Intelligent omnivorousness with no fuss" has been described as the ideal, but where loss of vitality is accompanied by poor nutrition it is worth while inquiring into minutiæ. I have found that a very important factor in the health of young women is a *hot*, fairly substantial midday meal. Many teachers now employ a cook to prepare a good dinner in their sitting-room, and office workers are fortunate if they can find a club where similar provision is made. Food in the big multiple shops is a great snare: it is apt to be overcooked and much less nourishing than it seems. Observation should always be kept for the "no-breakfast faddist," and the woman with food phobias retained from childhood who may be starving in the midst of plenty. In investigating cases of malnutrition among the children in a good class school I found that 5 out of 13 cases were cherishing food fads under the sympathetic eye of foolish relatives, and such whims sometimes persist throughout life. By increasing attention to such details of hygiene a real improvement has been and is still being obtained in the health of the younger women.

CARDIAC DISEASE.

Cardiac disease furnished 27 cases (3 per cent.). It was the most important single cause of invaliding permanently out of the service in 1925. These serious cases were of mixed origin—septic, rheumatic, and influenzal—and present no remarkable clinical features. There were many opportunities of noting how very reluctant patients are to obey their medical attendants' injunctions to rest in the early stages. A striking example of the value of this was seen in the first half of 1925 when I had a series of about 40 cases of "cardiac debility" due to influenza. All were away from one to six months, and practically all cleared up entirely. On the other hand, I am constantly seeing seriously damaged hearts whose initial failure dates from neglected attacks of influenza.

Because of its pulmonary, as well as its cardiac, complications *influenza* is a great foe of the woman who has to leave her home daily. The temptation to go out on a chill winter morning when "it may be only a cold" is very great, and puts the worker at a disadvantage with her domestic sister. Influenza is a most serious school disease, and one would like to see preventive inoculation tried in the schools on a large scale.

Pulmonary diseases constitute 49 cases out of the 900: 36 were cases of bronchitis or pneumonia, mostly in elderly teachers. Chronic bronchitis is seen most often in stout, flabby women who have lived sedentary lives, and it is hoped that a more active younger generation will escape this most troublesome complaint, which is a serious source of inefficiency from 55 onwards.

Laryngitis is responsible for many prolonged absences, and may be considered as an occupational disease of teachers. Noisy, dusty, and draughty schools play an important part in its causation, and suggest an obvious method of prevention. The common cause of former days—bad voice production—is now comparatively rare, as the subject is well taught in college. Excessive cigarette-smoking is a factor sometimes overlooked. Great benefit has followed to some of the cases in this series from removal of septic tonsils even after the age of 50.

The 16 *exophthalmic goitre* cases call for a special note, as this is a particularly serious disease in teachers. The medical advisers to this education authority have for many years paid special attention to hyperthyroidism, and have regarded definite signs of Graves's disease as a bar to entering the teaching profession. The strain of examination, and even more of work in the class-room, has an inimical effect on the course of the disease, and the temperamental instability which is a feature of hyperthyroidism is peculiarly unfortunate in a teacher. Of my 16 cases one has died; one has left the service gravely ill; five have developed serious nervous instability, though the symptoms have improved; five are still seriously ill; and only four have done well. In

some the necessity for prompt and prolonged rest from work was not recognised early enough.

GASTRO-INTESTINAL GROUP.

The *gastro-intestinal* group is large (96 cases), but shows some encouraging features. First may be noted in all teachers a very remarkable improvement in the care of the teeth. In only nine instances did septic mouths appear to be even a contributory cause of ill-health, and in but two of these was there any opposition to dental treatment. These figures would have seemed incredible 12 years ago, and show both the encouraging possibilities of health education and the value of the advice. One notes an almost dramatic contrast with the foul teeth of the lower grade workers, such as school cleaners, whose slow recovery after trivial accidents and ailments is largely due to septic absorption from the mouth. Secondly, there is a diminution in constipation, certainly in *neglected* constipation, which again furnishes an agreeable contrast to the days of our professional youth. But too many women have still to admit difficulty in securing adequate evacuations, and there is much reason to think that the 25 cases of appendicitis and 31 of other bowel troubles are associated with this condition. Two defects of hygiene may be suspected. One, lack of physical exercise, is common in the older women, who rarely played games in girlhood and had no opportunity of keeping them up after leaving college. The result is a general lack of muscle tone, flabby abdominal walls, and sagging viscera. The tennis-playing, dancing young professional woman of to-day has a much better chance of an alert middle age. The second common error is one of dietetics. Nearly every constipated person one meets nowadays claims to be a large fruit-eater, but, like all of us, has difficulty in getting a good supply of fresh vegetables. It has escaped comment that a curious, and I believe unique, food situation has arisen in this country during the last few years. Thanks to commercial developments large amounts of fruit now enter into the diet of all except the very poorest, but vegetables, especially green vegetables, are actually more expensive and unobtainable than in former days. The question arises whether we have not got too much into the habit of thinking of diet as a matter of purely hypothetical vitamins. Are "fruit and vegetables" really interchangeable? Certainly all those primitive peoples whose freedom from appendicitis and bowel troubles we envy, eat largely of both. It is a pity that it does not pay anyone to teach the public to "eat more vegetables."

A further encouraging sign is that "chronic indigestion" and dyspepsia seem to be diminishing. Of the 27 gastric cases, some 10 were gastric or duodenal ulcer, but the remainder were acute and were usually first attacks. The typical pink-nosed old maid, with her bottle of bismuth mixture and flow of confidences about her stomach troubles, is happily on the way to extinction. In addition to the improvements in hygiene before noted—to which should be added the abolition of the corset—credit is due to the more energetic and thorough treatment adopted by the modern practitioner. During the past year six "martyrs to indigestion" have come to announce triumphantly that they have been relieved of their symptoms by operations for appendicitis, gall-stones, or omental band.

A most important element in securing good digestion and good health is money to buy proper food. Women never really liked dining on sardines and cheap pastry, but they must pretend that they do when they can afford nothing better. Improved pay and professional prospects probably mean more in the reduction of digestive troubles than any other single factor.

CANCER.

Cancer was the chief cause of death among women teachers, 8 deaths out of 35 in 1925 being due to this cause. About 12 other cases are known to have been operated on in the last 18 months. The only point of interest which emerges is the old story of the need for earlier diagnosis and treatment. There have been some tragic cases of an ignorance of notorious symptoms almost incredible in educated women, but it is clear that the fault is not all on one side. There seems, as Dr. W. Fletcher Shaw points out in the *British Medical Journal* (June 19th, p. 1026), to be a great reluctance to examine in certain quarters. As it is impossible to be too explicit in popular education about cancer for fear of creating undue alarm, the only practicable course is to warn women in general terms to consult their doctors in certain events. If practitioners do not "play up," the bottom falls out of the whole preventive campaign, and the cancer death-rate will remain where it is.

The following table shows:

Teachers on Prolonged Sick Leave (1 to 12 months) Total number, 13,748.

1. Pulmonary disease (non-tuberculous)—			
Asthma	10		
Pneumonia and bronchitis, &c.	36	49	
Miscellaneous	3		
2. Influenza			84
3. Nervous system—			
Insanity	6		
Organic disease	47	293	
Functional	240		
4. Rheumatism—			
Rheumatic fever	21	37	
Chronic arthritis	16		
5. Infectious fevers			17
6. Ear, nose, and throat disease			68
7. Ophthalmic disease			12
8. Digestive system—			
Appendicitis	25		
Gastric	27	96	
Intestinal	31		
Gall-stones	13		
9. Circulatory system—			
Cardiac	27		
Anæmia	9		
Phlebitis and varicose veins	9	56	
Arterio-sclerosis	11		
10. Diseases of women—			
Hysterectomy	25		
Ovarian	9		
Malposition, &c.	11	66	
Menopause	11		
Menstrual troubles	10		
11. Accidents			49
12. Miscellaneous—			
Cancer	12		
Hyperthyroidism	13	73	
Pyorrhœa	12		
Mixed	36		
			900

DISEASES PECULIAR TO WOMEN.

The *diseases of women* are of special importance, not only on their intrinsic merits but as the chief alleged reason for discrepancy between male and female sickness rates. The 25 hysterectomy and nine ovarian cysts were responsible for a heavy time loss in senior teachers, as they were all absent for over three months. This liability to tumour formation between the ages of 40 and 60 would seem to be a sex disability which cannot yet be brought within the scope of preventive medicine. With menstrual disabilities the condition is far otherwise. Only 10 were noted in this series of 900; it is true that they would be expected to show as short and recurrent rather than long absences, but such short absences if persistent would be included in this series. It is hoped to conduct an investigation this year into the precise amount of interference with work due to the menses in teachers and nurses. Tentative inquiries have shown that it is surprisingly small. London teachers are not a selected class, in that no teacher has ever been excluded from the service on this ground, but for many years strenuous efforts have been made to supervise the health of the girls in the London training colleges (and probably those elsewhere), so that any necessary treatment is secured while in college. Very few young teachers have left still suffering from dysmenorrhœa or menorrhagia. One finds that the coöperation of the family doctor is very much easier to secure than it was 12 years ago, and the usual maternal attitude that pain at the periods is an act of God with which it would be impious to interfere is gradually disappearing. Twenty years ago the late Dr. J. W. Ballantyne, of Edinburgh, told me with grim amusement of his struggles to get his colleagues to take an interest in the then unfashionable subject of the ailments of the expectant mother. "Some think they're too trivial and others too hopeless, and they all look on it as a woman's job to put up with them, anyhow"! It is possible that a similar attitude to menstrual disability has been responsible for much unnecessary suffering.

THE MENOPAUSE.

The last group of the special ailments of women is that associated with the menopause, a period to which enormous significance is attached. Indeed, every untoward experience between 40 and 55 tends to be related to this physiological change. There is no denying the importance of what is happening. As a necessary part of the general atrophy of the reproductive organs, which is the essence of the change, the ovarian secretion gradually ceases and the whole elaborate and closely interdependent system of endocrine glands has to readapt itself to an altered condition of affairs. It is obvious that where there is already a lack of harmony in the endocrine system, or where for some reason the general shrinkage is irregular in its course, physical and mental signs of lack of endocrine balance will appear. To the endocrine enthusiast, who sees the woman even more than the man as the plaything of her ductless glands, these simple physiological facts are enough to account for any conceivable phenomenon, and popular superstition once again finds itself supported by modern science. There seems to be no good reason, however, why the degenerative changes in the reproductive system should not be accomplished as smoothly and with as little constitutional disturbance as the coming of puberty in a healthy girl. It is reasonable to demand that the classification of a mental or physical abnormality as due to the menopause should be a question of evidence in each case and not a generalisation based on the patient's age.

The practice of loosely attributing every ailment to the menopause has two very common and disastrous results: (1) the real causal condition (mental or physical) is apt to be overlooked and left untreated, or if treatment is recommended the patient ignores the advice. Neglect of uterine hæmorrhage, due to cancer, is a common example, but much more frequent is the failure to apply rational treatment to the neuroses and psychoneuroses of middle life because of this obsession. Many such examples might be quoted from the series under survey. (2) A special menopause-phobia may be set up which aggravates any pre-existing mental or physical weakness, and may itself make the patient seriously ill. This often occurs when there is no physical evidence of the menopause at all. One woman has been putting forward "the change" as a cause of her numerous nervous breakdowns for eight years. Her periods are still perfectly regular, and she has no sign whatever of endocrine disturbance. In the worst cases this dread is the last thing the patient will acknowledge.

Many of the women now passing through the climacteric were reared in a bad tradition of physiological ignorance, and they have no means of repelling the alarming superstitions about sex functions which circulate orally. I have found a notion, for example, among elderly neurotics that if they pass through "the change" with no discomfort they must "pay for it" by a nervous breakdown later.

The true facts of the matter are very difficult to ascertain, but inquiry from the older patients in this series and from other professional women shows that the vast majority of women pass through the climacteric with no more than a passing discomfort, and little if any disturbance of work. Flushes, sweats, headaches, dizziness, and difficulty in mental concentration make up the usual syndrome, but many women seem to escape altogether. Only 12 cases in all my series had symptoms definitely to the menopause, and they made good recoveries in one to three months, except where there was a definite pre-existing neurosis. No case of insanity, even remotely associated with the menopause, has been traced in the 18 months covered by this survey, but pre-existing anxiety neurosis or neurasthenia are for obvious reasons liable to become worse at the climacteric. No woman can be expected to *like* such a concrete reminder that middle age is upon her, and those of unstable or imperfectly adjusted temperaments will inevitably find adaptation to this new phase of life a difficult matter. Of the "geyser-like eruption" of the emotions which is said to precede the physical signs, I have, however, been unable to discover any traces. As far as my observation goes, the neuroses due to emotional repression seem to be much more common in the middle thirties than the forties. One finds that cantankerousness and groundless suspicion are not the monopoly of any one age-period; it is true these characteristics tend to harden into definite delusions in the later forties, but that is true of men as well as women.

The following table will give some idea of the relation of age in women to neurotic conditions and to the menopause. The cases analysed are unselected; they comprise all teachers seen by me as absenting themselves from work on certificates of "nervous debility," &c., over a period of 18 months.

—	20–	30–	40–44.	45–49.	50–54.	55–59.
*Neuroses and psychoneuroses..	42	56	30	35	30	31
Menopause	—	—	1	3	6	1

* No comparable figures exist for men.

It is interesting to note that the *total* absence due to "menopause and diseases of women" over a period of 15 years only amounted to an average of 0·13 day per year for each single woman and 0·24 day for each married woman, excluding pregnancy (Mr. J. Y. Hart).

Average days' illness per annum, 1904-19.

Nature of illness.	Men.	Single women.	Married women.
Pulmonary, throat colds, and influenza	2·08	3·50	3·91
Nervous and mental	0·58	1·43	1·98
Gastric	0·34	0·63	0·85
Rheumatism and synovitis ..	0·31	0·38	0·65
Infectious disease	0·18	0·33	0·28
Debility and anæmia	0·11	0·33	0·36
Heart	0·11	0·21	0·14
Ophthalmic	0·06	0·13	0·13
Dental	0·03	0·08	0·08
Menopause and diseases of women	—	0·13	0·24

There would in consequence seem to be no reason for the custom adopted by certain Government departments and large commercial houses of allowing their women employees one day's holiday a month. The practice adopted by a famous institution of getting rid of its women employees at 45 is equally unnecessary. These so-called concessions are very detrimental to the status of professional women.

INVESTIGATION OF NERVOUS SYMPTOMS.

Of the *functional neuroses* my series contained 240 cases. These conditions are particularly common in teachers of both sexes, probably because of the constant strain on the attention and the enforced contact with many different personalities involved in teaching. Mr. Hart found that "nervous and mental conditions" were responsible for 12·8 per cent. of the total absence on sick leave among men, 17·4 per cent. in single women, and 17·2 per cent. in married women. They entailed absences amounting to 0·58 day per annum for each man, 1·43 day for each single woman, and 1·98 day for each married woman over the 15-year period.

The 240 cases under survey included every form of neurotic and "mental" disturbance from slight fatigue and depression to certifiable insanity. No attempt at classification was made as acquaintance with most of the patients was necessarily too brief, though some were seen three or four times. Hysteria seems to be very rare; neurasthenia is most common, and anxiety neurosis a good second. I have been struck by the importance of nervous disease as a cause of unhappiness. The woman with inoperable cancer is

less to be pitied—and certainly pities herself less—than some of these neurotics, whose wretchedness does not end with themselves. One person can blight the lives of 60 children for a year and spread misery among her relatives and colleagues. Yet both the *cure* and *prevention* of the neuroses are on a far less satisfactory basis than those of physical ailments. Indeed, in certain quarters an attempt to apply any other remedy than "rest and change of scene" is regarded as a species of black magic.

A preliminary difficulty in dealing with neurotic patients is that the cause is often not recognised by the patient herself. I have been very much struck by the fact that in all this series the severity of the breakdown was in inverse ratio to the alleged cause. Where the teacher had collapsed as a result of some disaster (even the loss of a widow's only child, or a daughter seeing a beloved father killed before her eyes) she is back at work within a month—shaken, but able and anxious to carry on. The only exception is an unhappy love affair. Where the "cause" is vague or trivial, the prognosis is much more doubtful.

OVERWORK.

Overwork is one of the commonest reasons for breakdown alleged by teachers or their doctors—often where the patient cannot by any stretch of imagination be held to be overworking. The fatigue due to genuine overwork clears up rapidly with rest under good hygienic conditions, and does not entail absence of more than a few days or at most a few weeks. I have searched energetically but cannot remember seeing a single case in training college, schools, or in the Services during the war of *serious* breakdown due to this cause. Recently I have seen three women with severe neuroses who had in fact been working very hard. All denied having worries or that they knew of any other possible cause for their illness. Ultimately the first admitted that she had been reluctantly forced into teaching by a domineering mother, and was hankering after the occupation once followed by her father, and the second confessed that she had recently been sent from a school she loved to one she hated; "the work would have been nothing if I'd liked it." The third was seeking distraction from an unhappy love affair. It is significant that I have never known a girl break down permanently in the preliminary stages of the teaching profession who had not already desired to give up teaching, usually for reasons financial or amorous.

It will be found that what is called overwork is usually too monotonous work, or lack of recreation and emotional outlet. Often this is not the teacher's own fault, as the single women sometimes find that relatives make enormous claims on their time and money, without any of the compensations accruing to the married man. One lady had had upkeep of children imposed on her which would leave her without a spare penny for ten years. The entire burden of elderly parents is a common factor in these cases. Sometimes temperament rather than circumstance is to blame, and a woman may be suffering from a misunderstanding of her own needs. As one depressed lady in her late thirties remarked, she had been wasting her life at evening classes when she should have been learning to fox-trot. Teachers as well as children must know how to play if they are to keep healthy. Fortunately more attention is being paid in the women's colleges to this important item of mental hygiene.

OVERSTRAIN.

Overstrain at work is another factor very frequently blamed for breakdown, but practical experience shows that it often masks much more significant events at home. One elderly lady who arrived with this diagnosis in such a condition that it seemed unlikely she would ever work again finally admitted that a rascally relation had appropriated all her savings, and she had been afraid to tell anyone for fear he would be prosecuted. She was referred to her solicitor, and a few months later was at work bright and smiling, the relative having been made to disgorge. The lack of proportion shown is sometimes rather startling. A noisy classroom was solemnly and exclusively blamed in an anxiety neurosis where a young married woman had deliberately decided that children would be an unnecessary interruption to a career.

PARENTAL FIXATIONS.

Without entering into contentious theories of the origin of nervous conditions, it may be accepted that a person's attitude to authority and his own exercise of authority is very much determined by his attitude to his parents. This is particularly true of the Peter Pan type of person who has never properly grown up, and maintains an infantile attitude to his relations. Even on brief contact it is impossible not to be struck by the extreme childishness of some neurotics. Some of them, even women of 40, will bring a parent into the room to speak for them, although they maintain they are cured and anxious to return to work. A woman of nearly 30 is found to be sleeping of choice in the same bed as her mother; another woman of 55 says she cannot take the holiday her doctor suggests as she is "such a home bird," and has never left big sister! Nearly all this group (and it is a large one) have very similar school troubles which are commonly regarded as the cause rather than the effect of their mental condition. To every difficulty (especially if it involves a clash of will with an older person) they can only oppose the weak ineffectual protests of a child, and a flight into disease is a natural escape from situations in which they find themselves powerless. It is obviously very desirable to deal with these "parental fixations" as early in life as possible. They ruin a woman's career (they are significantly rare in head teachers) and interfere seriously with her chance of marriage. The most tragic results, far too common among professional women, are seen in later life. In old age parents need the support of a mature independent woman, not a clinging child, and they invariably despise and turn against the daughter who has never grown up, even if the situation should be of their own making.

Teachers are more fortunate than most professional women in that they can have the necessary time and money to recover from a deep-seated neurotic illness. They are doubly fortunate, however, if their medical attendant uses his tact and skill to discover an unsolved conflict or hidden terror behind the ostensible cause before ordering prolonged rest. A teacher told me that she had gone to her family doctor very ill and miserable, and complaining of overwork, which she genuinely believed accounted for her symptoms. As she did not improve in a week or two off duty he insisted on investigating further, and at last she confessed to a cancer phobia, born of family legends, and nourished by the anti-cancer propaganda of a well-known layman. As she said, in a few minutes' talk her doctor relieved her of a load of torment, and saved her from months of illness. I hope it is permissible to note here that the affectionate loyalty and appreciation of their doctor's services shown by these teachers goes far to disprove the gloomy rumours current as to the decline of the Family Doctor.

CONCLUSION.

The foregoing observations, although based mainly on a study of teachers, would probably apply, mutatis mutandis, to women in other professions. A comparison with domestically occupied women would be fallacious as involving the question of the effects of marriage. As the number of married women teachers in the London service is steadily decreasing, and as many of those still working are handicapped by special disadvantages, such as an invalid husband, I have omitted from this survey consideration of the effects of marriage on women's work. But there seems to be no reason to think that employment in the brain-working occupations outside the home has any detrimental effect on women's

bodies or minds. They start with slight initial handicaps in the form of (*a*) a higher sickness rate than men in all forms of disease; (*b*) a liability to a special group of ailments of their own; (*c*) a tendency to age sooner and more suddenly than men. My conclusion, based certainly on impressions rather than on exact figures (which do not in fact exist), is that all these handicaps have been exaggerated and can be considerably reduced by improved hygiene. In the days of under-payment and restricted opportunities of work the hygiene of women was far inferior to that of men as regards clothes, exercise, and diet. They have much leeway to make up especially as regards exercise and diet, but every year brings a demonstrable improvement. Education in the hygiene of the special ailments of women has hardly begun, but is already making a substantial difference in reducing disability. Without undue optimism, it seems reasonable to consider that preventive medicine has yet much to contribute to the problem of maintaining the physical efficiency of the professional woman.

SOME EXPERIMENTS ON THE CONDUCT AND FATE OF A LIGATURE MADE FROM THE PARIETAL PERITONEUM OF THE OX

WHEN IMPLANTED IN LIVING TISSUE.*

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(*With Illustrative Plates.*)

IN a volume [1] entitled "Ligation in Continuity," published by Mr. W. Edmunds and myself in 1891, the figures 129 and 130 represent the microscopical appearance of a peritoneal ligature after being applied respectively 14 and 55 days around the carotid of a horse. (Figs. 1 and 2.)

Some three or four years previous to the publication of this book, when showing microscopical sections of kangaroo-tendon ligatures undergoing absorption to the then Sir Joseph Lister, he remarked "that the best material for an absorbable ligature was white fibrous tissue, and that the purest white fibrous tissue in the body was the peritoneum; he thought, therefore, that the best material for a ligature would be peritoneum, and that he had himself tried it, and with success, on the carotid artery of a calf."

Accordingly, we obtained from the butcher a large piece of the parietal peritoneum of the ox; it was fixed and stretched on a board, cut into strips, and twisted into ligatures, which were further prepared by immersion in solutions of chromic acid and carbolic acid. However, these home-made ligatures were not very satisfactory, and we asked Messrs. Macfarlan, of Edinburgh, to prepare some for us; these ligatures were made in various sizes, and were from 18 to 20 inches long. Subsequently Messrs. Macfarlan made peritoneal ligatures for us, not directly from the ox peritoneum, but from gold-beaters' skin, which is ox peritoneum beaten out thin. The peritoneal ligatures thus made resisted absorption for a somewhat longer time than kangaroo-tendon ligature of the same size.[2] The peritoneal ligature seems to satisfy all the tests of a perfect ligature when employed for the ligation of a large artery in continuity. Being of white fibrous tissue, it is of the same structure as the outer coat and sheath of an artery; it is strong, inelastic, round, smooth, pliable, can be made of any suitable size, is easily tied in a knot, is slowly absorbed, and is easily rendered aseptic.

* The Medical Research Council defrayed the expenses of this research, and the experiments were performed at the National Research Institute, Hampstead. The microscopical sections were cut and stained by Mr. S. P. Steward at the Royal College of Surgeons of England, by the kind permission of Sir Arthur Keith.

[1] MacMillan, 1891. [2] Ligation in Continuity, p. 267.

When a ligature is absorbed it is replaced by new living tissue; there is no interval between the living material and the ligature. The arrangement of the fibres of the new tissue is influenced by the structure of the ligature, and the stages in which it has yielded to solution. As Lister explained, "the new tissue takes as a model the old, and forms at its expense, the old tissue is absorbed by the new, and as the old is absorbed new is put down in its place."

Lister noted too that a peritoneal ligature placed round the carotid artery of a calf,[3] and examined 30 days afterwards, appeared on casual inspection still to be in place; but it was no longer the ligature that was visible encircling the artery, for by absorption and substitution it had been almost entirely transformed into a band of living tissue. This band had, indeed, a deceptive resemblance to the former condition, but on careful examination it was seen to be continuous in structure with the arterial wall. In the centre of the loop of living tissue was a remnant of the original ligature (so that in 30 days the process of absorption and substitution was as yet incomplete).

> "The fleshy material around the remains of the loop of the ligature proved under the microscope to be a most beautiful example of fibroplastic structure, the fibres which mainly constituted it being composed of large elongated cells with long processes. It appears, then, that by applying a ligature of animal tissue around an artery we virtually surround it with a ring of living tissue, and strengthen the vessel where we obstruct it. The surgeon may now tie an arterial trunk in continuity close to a large branch, secure against secondary hæmorrhage; provided always that he has so studied the principles of the antiseptic system, and so carefully considered the details of the mode of dressing, that he can feel certain of avoiding putrefaction in the wound. For my own part I should now without hesitation undertake the ligation of the innominate artery believing that it would prove a very safe procedure."[4]

In "Ligation in Continuity" (Fig. 115, p. 257) are figured two carotids of the ass ligated with kangaroo tendon. The specimens were obtained 67 days and 77 days respectively after the performance of the operations. The ligatures appear at first sight in place and unaltered, but on transverse microscopical section of the loops of the ligatures they are seen to be entirely replaced by young connective tissue, the dead tendon band being substituted by one of living fibrous tissue.

The question naturally arises as to the nature of the intimate processes of absorption of a peritoneal or other animal ligature. Such a ligature is a foreign body, and all foreign bodies which can be acted on by the living cells and fluids are absorbable; but the time required for absorption and substitution of different materials varies greatly. Silver wire and ivory pegs become pitted on their surfaces after a stay of a few months in the living body. The attack of the living cells on pure gold wire fails, as does also the attack of the body cells on a tracheotomy tube made of platinum. In a case of ligation of the external iliac artery with silk for femoral aneurysm it is interesting to recall what Lister found ten months later—

> "fragments of the ligature of various lengths, many of them greatly reduced in thickness. They had the appearance of being superficially *nibbled* so to speak, confirming the impression conveyed by the naked eye characters of the knot, that the silk had been eroded by the absorbing action of the surrounding parts. Indeed, considering the organic origin of silk, the remarkable thing seems to be, not that it should be absorbed by the living tissues, but that it should resist their influence so long."

In a paper published [5] by Sir Charles Sherrington and myself, the key to the understanding of the

[3] Remarks on the Antiseptic System of Treatment in Surgery, Brit. Med. Jour., April, 1869. Lister published a remarkable series of addresses under the above title in the same journal for 1867, 1868, 1869, and 1871.

[4] The truth of the statement made by Lister in 1869 has been proved, since that date, by the general experience of surgeons. The cases reported in two papers of my own confirm Lister's wonderful forecast. (1) A Case of Ligation of the First Part of the Left Subclavian Artery, Royal Army Medical Corps Journal, vol. xxxi., 1918. (2) Cases of Ligation of the Innominate Artery, British Journal of Surgery, vol. x., 1921.

[5] Journal of Physiology, 1889.

process of absorption of a peritoneal or other animal ligature is to be found. The interpretation of the appearances seen in our microscopical preparations of films from Ziegler chambers was greatly assisted by a study of papers [6] by Miss Greenwood. Miss Greenwood's observations were conducted on living specimens of amœba proteus and actinosphœrium, and she was able to follow in these animals under the microscope all the visible phenomena of the ingestion of prey.

"The food most suitable to these forms is unshielded non-coagulated proteid matter. A low degree of vitality, a diminished activity of the protoplasm renders an organism easier prey, more readily captured, and more readily absorbed. Little monads, euglenæ, and algæ, co-existing in the same water with amœba proteus, were by it ingested. A fluid medium in the food vacuole of the amœba appears essential for the manifestation of primitive digestive activity. The absence of a vacuole around ingested material may indicate that it is innutritious, and thus nutritive material may be distinguished from innutritive."

In the experiments of Sir Charles Sherrington and myself, successive immigrations of cells were observed to enter the Ziegler chambers. The only cell which had a permanence of sojourn in the experimental chambers was the wandering connective tissue or plasma cell. The place of amœba proteus and actinosphœrium was taken by the connective tissue cell, which may be described as a hot-house variety of amœba. The connective tissue cell was observed ingesting in its food vacuole living prey—viz., a leucocyte or a red corpuscle. It found its unshielded non-coagulated proteid food to perfection in the dead or dying leucocyte. In some vacuoles the captured leucocyte or red corpuscle was more or less altered, but still perfectly easily recognised, while in others only a granular débris remained that furnished no sufficient clue as to its nature, but which seemed to be the remains of digested prey. Clearly a proteolytic ferment is secreted in the food vacuole of the connective tissue cell, as it is in the food vacuole of amœba proteus. Is it not probable that the wandering and fixed connective tissue cell can exert digestive action also upon material which it does not incept? Monads in Miss Greenwood's experiments which came to rest against the protoplasm of amœba proteus without being taken into the food vacuole became inert and dead, and were apparently acted on by the same agent as was present in the food vacuole. She relates, too, the escape of a flagellate infusorian after contact for one hour with an actinosphœrium, and adds that its movements, after escape, were less rapid than usual. Suppose a proteolytic ferment is secreted by the connective tissue cell from the surface of its protoplasm, and a leucocyte simply approximated to or partially embayed in the protoplasm, a gradual dissolution of the proteid of the leucocyte in the tissue plasma would occur; and this was observed.

The number of instances in which there could be detected in the Ziegler chambers a wholly or partially included leucocyte would not account for the multitude of these cells that disappeared. If, on the other hand, a proteolytic ferment is secreted from the surface of the connective tissue cell it makes clear what would otherwise be obscure, the absorption and substitution of organic ligature material, which is certainly not all dissolved in the food vacuoles of the invading cells. It would also offer an explanation of the changes that occur in the microscopical appearance of a blood-clot, or of an organic material such as a ligature of catgut, tendon, or peritoneum, within a week or ten days of being buried in living tissue. At this period the foreign body is already surrounded by a countless number of phagocytic cells, some of which have commenced to invade it. The outline of the cells of a blood-clot becomes obscure and the surface of a section of tendon, of catgut, or peritoneal tissue [7] tends to become more opaque and to lose all indication of structure long before the connective tissue cell is in actual contact with the parts so altered. Obviously some chemical agent is at work, which is the more potent, and the more effective, in the initiation of the dissolution of the foreign body, the closer the foreign body is to the connective tissue cell. There are many analogies supporting this view of the action of the connective tissue cell. 1. All the known ferment-manufacturing cells pour their secretions into the world outside themselves. 2. In the typical process of ossification the osteoblasts of Kölliker cause absorption of the walls of the primary areolæ by means of a secretion from their surface. 3. The myeloplaxes of bone cause absorption of bone. 4. The same thing occurs in rarefying osteitis. In the three latter examples the cells are of mesoblastic or connective tissue origin.

As the connective tissue cells increase in number in the Ziegler chambers they form cell-islets or colonies, which surround the stores of nutriment that is gradually dissolved and digested. At first the shape of those cells, which are immediately next to the kernel of nutritious matter in the islet, is irregular, and suggests amœboid movement of the protoplasm of the cells; later, each cell becomes regularly fusiform, and is applied by its side to the material, which gradually disappears. The captured food comes to be encircled by chains of fusiform cells set concentrically around it. This is what happens when any foreign body, such as a ligature or a blood-clot, lies within a wound that heals over it. The fusiform fibroblasts slowly exert the same solvent action upon the imprisoned material as did their amœboid ancestors. No doubt the more easily affected portions of the material are the first to go into solution and disappear, leaving a constantly less amenable residue and a less nutrient one. Perhaps it is in accordance with the decreasing supply of food that the cells, in contact with the residuum of food, undergo a gradual change and lose their pristine elasticity of form. They assume the spindle shape, and a fibrillated intercellular cement substance comes into existence between them. Much as amœba under adverse conditions assumes an encysted form, so when food is scanty do the inherited tendencies of the fibroblast lead it into states of quietude or encystment. Encapsulation, it is important to note, of a foreign body, such as a blood-clot or a ligature, is a stage in the process of absorption.

For many years after catgut was reintroduced to the notice of the profession in 1869 by Prof. Lister, then of Glasgow, it proved in the hands of many surgeons for various reasons unreliable in use. Bryant, of Guy's, read before the Clinical Society on Oct. 12th, 1877, a paper in which he reported the ligation of the external iliac, common carotid, right subclavian, and common femoral arteries with carbolised catgut. From our present-day knowledge the results were unsatisfactory, but Bryant expressed his belief that "we have in the carbolised catgut the best ligature at our disposal." Callender, of St. Bartholomew's, read a paper before the Clinical Society on Feb. 8th, 1878, in which he recommended the use of tendon ligatures instead of catgut ligatures. He writes: "Catgut occasionally fails to arrest the blood stream for a time sufficiently long to allow of the cure of the aneurysm, and this failure imperils the life of the patient." The kangaroo-tendon ligatures were sent to Callender by Hulme, of Guildford, who had received them from Girdlestone, of Melbourne. Callender says "that in tendon ligatures we possess a material which resists the solvent action of its surroundings in a wound longer than catgut. Its strength is sufficient: it ties better knots and the knots do not slip." He adds: "As the supply of these tendons is distant I am having prepared ligatures which are made from the tendons of the horse. They have much the same characteristics as the tendons from the marsupial."

In some cases the failure of the operation was not due to the catgut or tendon ligature employed. Sir Thomas Smith [8] ligatured the common iliac artery with kangaroo tendon. The next day pulsation was

[6] Ibid., 1886 and 1887.
[7] See Chapters 8 and 10 in Ligation in Continuity.
[8] Trans. of the Clinical Society, 1887.

noticed to have occurred. He attributed the looseness of the loop of the ligature to the first part of the reef-knot slipping before the second part was completed. Thus, although the knot was secure, the loop was loose; this, too, was no doubt what occurred in other cases.

In Bryant and Callender's time the manufacture of the catgut ligature was unsatisfactory, and the nature of the process of absorption of an animal ligature was not clearly comprehended. Even as late as 1890 I found, on examining microscopical sections of catgut obtained from various sources, that they showed the presence of the villi of the small intestine (Fig. 3), though Lister had directed that the mucous membrane of the sheep's intestine should be removed by mechanical means before the material was cut into strips, and twisted into a thread of surgical catgut. Recently, in examining microscopical sections of catgut kindly supplied to me by Mr. Merson, of Edinburgh, I found that the appearance of the sections did not correspond with the appearance of the sections of ox peritoneum ligatures also supplied by Mr. Merson. The difference is probably due to the presence in the catgut ligature not only of fibrous tissue but also of muscular tissue. During the Great War, whenever I had the opportunity of ligating one of the large arteries, I employed kangaroo-tendon ligatures (Van Horn) (tendon is a form of white fibrous tissue), tied with a stay-knot, and in every case success was attained.

I am informed that it is increasingly difficult to obtain kangaroo tendons; they are now used for other purposes than surgical ligatures. Hence, I think Lister's peritoneal ligature might well replace the use in surgery of kangaroo tendon. A study of the figures illustrating this paper shows that the peritoneal ligature is particularly well adapted for this purpose, especially if chromicised, which process delays the absorption of the ligature and is in no way surgically disadvantageous.

Mr. Merson kindly had some ox peritoneum ligatures prepared for me. They were of various sizes, from No. 00 to No. 8, and were either plain or chromicised as follow: 1. Plain ligatures prepared from the tissue in its natural state unhardened in any way whatsoever. 2. *A* ligatures—chromicised—prepared from broad strips of peritoneum tissue ¾ to 1 inch in width. 3. *B* ligatures—chromicised—prepared by twisting a number of very narrow strips of tissue ⅛ to ¼ inch in width.

Mr. Merson writes that "he is quite prepared to find that *B* strings made from very narrow ribbons of tissue will break down more readily than those made from broad strips." It was to be expected that with many more channels leading into the interior of the ligature, formed by the twisting of several narrow strips of tissue, that the invading cells would have greater facilities for reaching the interior of the ligature. In this way the ligature is split up into little islands which are encircled by cells, so that absorption and substitution is much facilitated.

On the other hand, when the peritoneal ligature is made from broad strips of tissue the result is that absorption takes place mainly from the surface as it does in the case of kangaroo tendon. A chromicised ox peritoneum ligature of suitable size, made from broad strips of membrane, appears to be a perfect ligature for the ligation of a large artery in continuity, or for use in the operation for the radical cure of hernia. There are many other operations in which the ox peritoneum ligature, either plain or chromicised, might be usefully employed, seeing that this ligature resists absorption for a somewhat longer period than catgut. It appears to me that ox peritoneum ligature of all sizes and for all purposes is superior to catgut; it is composed of one tissue and one tissue only—white fibrous tissue; but unless made in large quantities it would be probably more expensive than catgut.

To conclude, this research gives support to the opinion expressed by Lister long ago that the best ligature material is peritoneum, and is published as a humble tribute to the immortal memory and genius of the Master.

THE ABSORPTION OF THE OX PERITONEUM LIGATURE AS SHOWN IN THE DRAWINGS AND FROM THE STUDY OF THE MICROSCOPICAL SECTIONS.

When an artery is ligated the attack of the invading cells on the ligature is at first, and, indeed, for a long period, confined to that surface of the ligature which is farthest from the arterial wall. This is due to the tension of the structures within the loop of the ligature (see Figs. 2 and 3). The same fact has been observed in the experiments in which within the loop of the ligature was compressed not an artery but muscular tissue (see Fig. 18).

The anatomical features of plain and chromicised ligatures when observed under the microscope are identical. Chromicised ligatures and those made from broad strips of membrane resist absorption for a much longer period than plain ligatures and those made from narrow strings.

The multitude of cells which collect around the ligature is a striking and early manifestation of the reaction of the tissues to the presence of a foreign body in their midst. The cells enter the cracks and fissures of the ligature, when these exist, and divide it successively into small islands. As absorption of the fragments of ligature proceeds the columns of cells within the cracks and fissures widen, and as the dead tissue disappears living tissue is put down in its place. At last the fragment of the ligature is completely dissolved and its place is occupied by cells which, having completed their duty and destiny, become elongated, and spin fibrils of connective tissue.

The cells, while actively engaged in the warfare against the ligature, are of all shapes, their protoplasm giving the appearance of amœboid movement. The nuclei of the cells are generally oval in outline, indicating their descent from connective tissue corpuscles. A group of cells surrounding the main mass of the ligature assume a spindle shape. This capsule of young fibrous tissue is not wide, but it shuts off the dead tissue from the rest of the body. Within it absorption of the surface of the ligature proceeds. Some three or more weeks later it can be observed that some unabsorbed fragments of the ligature are outside the capsule of fibrous tissue, so that absorption of the surface of the ligature has taken place in an irregular manner. The capsule becomes smaller as the enclosed mass shrinks in size. The surface of the ligature has resisted absorption in some places for a longer time than in others. It would seem that as the ligature is absorbed certain cells within the encircling band of fibrous tissue enter the resting stage and form fibroblasts, while the outer layers of spindle cells of the band of fibrous tissue resume an active life, being stimulated thus to act in consequence of the presence of unabsorbed fragments of ligature outside the encircling band of young fibrous tissue. Thus, as the mass of ligature shrinks in size, the fibrous capsule still remains in contact with it, the capsule of the ensheathing fibroblasts diminishing in diameter as the foreign body is absorbed. On the other hand, in those instances in which absorption of the ligature mainly takes place by the action of the cells which penetrate into its interior, the original circle of fibrous tissue remains in place and forms the outer limit of young fibrous tissue which is substituted for the ligature.

The tissue outside the capsule of fibrous tissue when there are unabsorbed fragments of ligature in this situation is composed of a numerous army of active single cells, giant cells, and a great number of newly formed capillaries. The vascularity of this tissue is a necessary part of the process of absorption, for the dissolved material of the ligature must ultimately be carried off by the blood stream and by the lymphatics; and, further, it is from the blood that the cells obtain materials for their sustenance and for the manufacture of a proteolytic ferment. Giant cells are numerous wherever active solution of the ligature

is taking place, either within or without the capsule of fibrous tissue. Where a portion of ligature has nearly or completely disappeared, there occurs a yellowish staining of the cells which afterwards disappears.

Two methods of absorption are shown in Figs. 24, 25, and 26. Fig. 26 shows a fragment of ligature undergoing absorption within a giant cell, and Figs. 24 and 25 show numerous cells encircling a fragment of ligature with certain clear spaces between some of the cells and the fragment of ligature. These spaces probably contain the proteolytic ferment in a fluid medium, and if this is so, Miss Greenwood's dictum that "a fluid medium is necessary for the manifestation of primitive digestive activity" is fulfilled. In the case of the giant cell (Fig. 26) there is no visible space between the protoplasm of the cell and the fragment of ligature, but both in the case of the giant cell and in the other instances where the fragment of ligature is surrounded by many cells, the structure of the fragment of ligature has undergone a change, some parts of it seem not much altered, while in other parts clear spaces appear to exist. These spaces indicate parts of the fragment which is already dissolved, and they may contain fluid and the proteolytic ferment.

It is not at first easy to find in the sections a fragment of ligature undergoing absorption in a food vacuole of an individual cell. In order to do this the granulation tissue in which absorption is actively taking place should be teased out in the fresh state and the cells fixed with osmic acid. A few examples of this method of absorption have been seen and three such cells are shown in Fig. 27. In some vacuoles a fragment of ligature could be identified, while in others only a granular débris remained that furnished no sufficient clue as to its nature, though the surmise that it is the remains of digested ligature is probably true. Many cells have been observed in which the protoplasm was full of granules of varying size, difficult to see, which were not the granules of regular size normally present in the protoplasm. In such cells no food vacuole was present, and the impression on the mind of the observer was that this was the last stage of the process of absorption, the food vacuole having given up the granular remains of the ligature to the surrounding protoplasm.

In some situations close to a fragment of ligature undergoing absorption (see Fig. 16—four weeks—Figs. 18, 19, and 20—nine weeks—and Fig. 23—13 weeks) the surface of the remains of the ligature when viewed under a high power is seen to be broken up into small islands surrounded by cells. Outside these islands are a closely packed mass of cells with oval nuclei. In the protoplasm of the cells are several refractile granules of varying size, distinct in some cells and indistinct in others. These granules do not belong to the structure of the cell itself, and appear to be minute particles of some foreign body in process of dissolution.

When all the ligature has been absorbed and replaced by the living cells, the latter lose their pristine flexibility of form, become spindle-shaped, and spin fibrous tissue. The outline of the original dead material of ligature can be recognised by the shape and size of the fleshy mass of new living tissue which has been substituted for it.

ABSORPTION EXPERIMENTS.

These were carried out by passing the ligature through a portion of the muscle of the rabbit, the animal being anæsthetised with ether. The ligature was tied with a reef-knot. All the wounds healed by first intention. Some experiments were done with catgut in order to contrast the time of absorption of this material with that of the ox peritoneum ligature.

(a) List of Experiments with Catgut Ligature.

Plain (not chromicised) catgut ligature.	Animal killed at the end of—
1	1 week.
2	2 weeks.
3	3 "
4	4 "

(b) List of Experiments with Ox Peritoneum Ligature.

Plain (not chromicised) ox peritoneum ligature.	Animal killed at end of—	Chromicised ox peritoneum ligature.	Animal killed at end of—
1	1 week.	4	4 weeks.
2	2 weeks.	5	7 "
3	3 "	6	9 "
		7	13 "

The catgut ligature used in the experiments was No. 4. size. The ox peritoneum ligature used was No. 4 size in Experiments 1 to 5 and No. 8 size in Experiments 6 and 7.

DESCRIPTIONS OF ILLUSTRATIONS.

(SEE ILLUSTRATIVE PLATES AND FIGURES IN THE TEXT.)

DRAWINGS ILLUSTRATING CERTAIN OLD EXPERIMENTS (Figs. 1–3).

FIG. 1.—*Ox peritoneum ligature* which had been applied for 14 days round the carotid artery of the horse (× 50). The ligature was made by Messrs. Macfarlan, of Edinburgh, about the year 1887. The folds formed by the twisting of the membrane are seen separated by white spaces. The side away from the artery is uppermost, and in this situation many cells have collected; absorption has commenced. The fibrous structure of the ligature can no longer be seen. (See "Ligation in Continuity," Fig. 129.)

FIG. 2.—*Ox peritoneum ligature* which has been applied for 55 days round the carotid artery of the horse (× 50). The ligature was made by Messrs. Macfarlan, of Edinburgh, about the year 1887. The spaces between the folds into which the membrane was thrown in manufacture are seen as white streaks, and it is along them that on the side away from the artery that cell invasion is occurring. It is only on this side that absorption and substitution is actively proceeding. The fibrous nature of this ligature can no longer be seen. (See "Ligation in Continuity," Fig. 130.)

FIG. 3.—*Chromic catgut ligature which had been applied for three days round the carotid artery* of a sheep (× 90). The operation was performed at the Pathological Institute at Leipzig in the summer of 1884. The microscopic sections were cut and mounted in the autumn of that year at St. Thomas's Hospital. The actual section from which the above drawing was made is beautifully preserved (1925). In the lower part of the drawing the arterial wall under the knot of the ligature is shown, but it does not appear in the section from which this drawing was made. It is copied from a drawing of another section in order to complete the picture of the ligation of the artery.

The villi of the mucous coat of the sheep's intestine, from which the ligature was made, are clearly seen; as are also the fissures formed by the twisting of the gut. A dense mass of cells are collected on the side of the ligature away from the artery. The tension between the arterial wall and the side of the ligature next to it interferes with the cellular invasion in this region.

DRAWINGS ILLUSTRATING THE STRUCTURE OF CERTAIN LIGATURES (Figs. 4–11).

FIG. 4.—*Ox peritoneum ligature* (× 100) made from wide strips of tissue. The ligature consists of pure white fibrous tissue. The section looks like a section of a fibroma. The folds formed by twisting the membranes in manufacture are few in number and are separated by white streaks.

FIG. 5.—*Ox peritoneum ligature* (× 100) made from narrow strips of tissue. The ligature is composed of pure white fibrous tissue. The folds formed in manufacture by twisting the membranous strings are numerous, and are seen separated by white streaks.

FIG. 6.—*Portion of ox peritoneum ligature, seen in Fig. 4, more highly magnified* (× 160). The section shows in detail the fibrous structure of the ligature.

FIG. 7.—*Gold-beaters' skin ligature* (× 100). This ligature (No. 2 size) was made by Messrs Macfarlan, of Edinburgh, about the year 1888. It was sent to me in a bottle containing carbolic oil, and has remained in this medium ever since (1925). Gold-beaters' skin is made from ox peritoneum and the structure of gold-beaters' skin ligature is, therefore, white fibrous tissue; compare with Fig. 4.

FIG. 8.—*Portion of gold-beaters' skin ligature.* Seen in Fig. 7, more highly magnified (× 160). Compare with Fig. 6. The section shows in detail the fibrous structures of the ligature.

FIG. 9.—*Kangaroo-tendon ligature*, medium size, Van Horn (× 160). A tendon consists of bundles of white fibrous tissue with chains of cells. The cells partially ensheath the bundles of fibres and are connected by a network of branched processes. The structure of tendon is well seen in the section.

FIG. 10.—*Portion of catgut ligature*, Merson (× 160). Made from narrow strips of tissue. The ligature does not appear to be made up, as is ox peritoneum ligature, of fibrous tissue only. Under a one-twelfth oil-immersion lens no markings indicative of muscular tissue are visible, but there can be seen faint longitudinal striations which may be due to the presence of fibres of the longitudinal muscle coat as well as of the fibres of the peritoneal coat of the gut. The curious angular markings on the section may possibly have been caused by the scraping process employed to get rid of the mucous membrane of the gut during the process of manufacture as originally directed by Lister.

FIG. 11.—*Portion of chromic catgut ligature*, size No. 3, Van Horn (× 160). The structure of the ligature appears homogeneous. It is not possible to identify under the microscope either the fibrous or muscular coat of the sheep's intestine. There are no longitudinal striations.

DRAWINGS ILLUSTRATING THE ABSORPTION OF THE OX PERITONEUM LIGATURE (Figs. 12–23).

FIG. 12.—*Catgut ligature* (plain, not chromicised), showing absorption after one week (× 38). Made from narrow strips of tissue. Note the cellular invasion and the absorption of the ligature already occurring, especially along its lower border.

FIG. 13.—*Ox peritoneum ligature* (plain, not chromicised), showing absorption after one week (× 38). Made from narrow strips of membrane. Note the outline of the ligature is more distinct than the outline of the catgut in Fig. 12, in which absorption is more advanced. The invading cells are advancing into some of the cracks and fissures. The fibrous structure of the ligature cannot be made out.

FIG. 14.—*Ox peritoneum ligature* (plain, not chromicised) (× 38), showing absorption after three weeks. Made from narrow strips of tissue. Note the cellular penetration and absorption of the ligature along the edges of the numerous folds caused by the twisting of the strips of membrane in manufacture. The active cells invading the ligature take a deeper stain than those surrounding and encapsulating it. As absorption proceeds the channels in the ligature become wider, the dead ligature material being replaced by living cells.

FIG. 15.—*Catgut ligature* (plain, not chromicised) (× 50), showing absorption after four weeks. Made from narrow strips of tissue. Note the great cellular proliferation and the almost complete absorption of the ligature.

FIG. 16.—*Ox peritoneum ligature* (chromicised) (×60), showing absorption after four weeks. Made from wide strips of tissue. Note the cellular invasion from the surface of the ligature. The outline of the drawing indicates nearly the size of the original ligature, its outer surface having been absorbed and substituted by living tissue. The fibrous structure of the ligature cannot be made out. The breaking up of the outer surface of the ligature into little islands surrounded by cells is well seen. Contrast with Figs. 14 and 17.

FIG. 17.—*Ox peritoneum ligature* (chromicised) (× 38), showing absorption after seven weeks. Made from narrow strips of membrane. Note the slower absorption of the ligature as compared with the ligature illustrated in Fig. 14. The interior of the ligature is being divided up into small islands. Each island is in part or wholly surrounded by the invading cells. This makes more easy the process of absorption. Compare with Fig. 16 and note the scheme of absorption is different in the two experiments.

FIG. 18.—*A sagittal section through the ligatured muscle and through the knot and loop of the ligature of* chromicised ox peritoneum ligature (× 20)—nine weeks. The ligature was made from broad bands of membrane. The muscle included in the ligature is strangled and dead. Cells are invading the dead muscle from each side, but the tension between the muscle and the side of the loop of the ligature next to it has interefered with the cellular invasion in this region. There is still much dead muscle to be absorbed. The external half of the loop of the ligature in the lower part of the drawing has been absorbed, and the upper half of the corresponding portion of the ligature under the knot shows about the same amount of absorption. The remnant of the knot is visible as numerous fragments of ligature surrounded by an innumerable army of attacking cells. *E* is the site of high power drawing of Cells 2 and 3 in Fig. 27.

FIG. 19.—*A horizontal section through the middle of the loop of the ox peritoneum ligature* seen in the lower part of drawing Fig. 18 (× 38)—nine weeks. In the main the ligature is being absorbed from the surface. The original size of the ligature nearly corresponds to the oval area shown in the drawing. In the mass of cells immediately surrounding the ligature are numerous capillaries, fragments of ligature as yet unabsorbed, and many giant cells containing in their protoplasm or surrounding with the help of other cells portions of ligature in the process of absorption, but these details require a higher power (Zeiss D lens) to be observed. The yellow bands of material in the right lower portion of the drawing may be muscular fibres being absorbed. *B* is the site of the high power drawings Figs. 24 and 25.

FIG. 20.—*A horizontal section above the middle of the remains of the knot of ox peritoneum ligature* seen in the upper part of the drawing Fig. 18 (× 38)—nine weeks. The drawing shows two fairly large portions of ligature in the process of absorption from the surface. In the mass of cells are seen a great number (with a higher power) of fragments of ligature in the stage of active absorption and substitution by the cells. Only the larger fragments are visible in the drawing. Giant cells are to be seen also with a high power dotted about among the army of single cells. In this case the knot was probably not tied tight, hence the invading cells were able to reach its interior and attack the strands, of which the knot is made up, separately. *C* is the site of the high power drawing Fig. 21. *D* is the site of the high power drawing of Cell 1 in Fig. 27.

FIG. 21.—*High power drawing of fragments of ox peritoneum ligature* seen at *C* in Fig. 20 within the fibrous capsule (× 200)—nine weeks. Fragments of the ox peritoneum ligature are seen surrounded by a multitude of single cells and a few giant cells. Absorption is taking place.

FIG. 22.—*Section through the knot of a chromicised ox peritoneum ligature* (× 30)—13 weeks. The ligature was made from broad bands of membrane. The drawing shows that absorption has taken place from the surface, the cells having been unable to penetrate between the various strands of the knot, as is seen in drawing Fig. 18. Below, the immense cellular invasion extends as far as the muscle, but above, the granulation tissue was broken off in making the section The amount of absorption already effected is considerable The tissue of the knot extended half-way at least to the muscular tissue in the lower part of the drawing, and it is probable that the same amount of substitution of living tissue for the material of the ligature has occurred in the whole circumference of the knot. In the vascular tissue stained blue outside the surviving portion of the knot are to be seen in this drawing many lighter areas which represent fragments of ligature that have as yet escaped solution. Under a higher power these fragments of unabsorbed ligature are very numerous, and giant cells and capillaries are visible around them. The remnant of the knot is surrounded closely in most places by a narrow band of young fibrous tissue. No evidence of fibrous structure can be detected in the unabsorbed portion of the ligature.

FIG. 23.—*A section through the granulation tissue surrounding the unabsorbed portion of the knot of ox peritoneum ligature* seen in Fig. 22 (× 38)—13 weeks. In one place a considerable portion of ox peritoneum ligature is seen undergoing absorption. It may be that this is one of the free ends of the knot of the ligature. The rest of the drawing of this section shows very numerous fragments of ligature not yet absorbed. Under a higher power giant cells and single cells containing fragments of ligature can be observed and numerous capillaries. The whole area of the drawing was obviously originally occupied by the ox peritoneum ligature of the knot. *A* is the site of the high power drawing Fig. 26.

DRAWINGS ILLUSTRATING THE INTIMATE PROCESS OF ABSORPTION OF OX PERITONEUM LIGATURE BY GROUPS OF CELLS, BY A GIANT CELL, AND BY SINGLE CELLS (Figs. 24–27).

FIG. 24.—*A fragment of ox peritoneum ligature encapsuled by young fibrous tissue and undergoing absorption* (× 750)—nine weeks. Within the capsule in the lower part of the drawing is seen a giant cell, and many clear spaces are visible which may contain a proteolytic ferment in a fluid medium. This would explain the slow dissolution of the fragment of ligature which is homogeneous in

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FIG. 1.

FIG. 2.

FIG. 3.

FIG. 4.

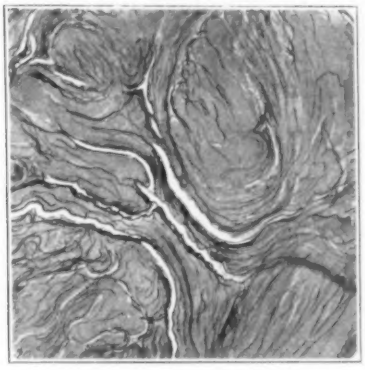


FIG. 5.

FIG. 6.

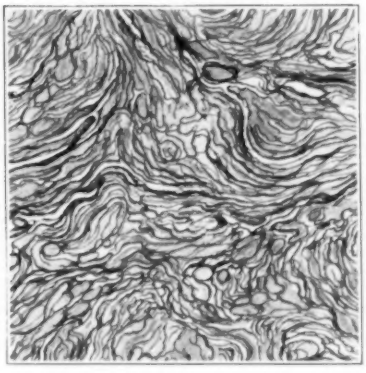


FIG. 7.

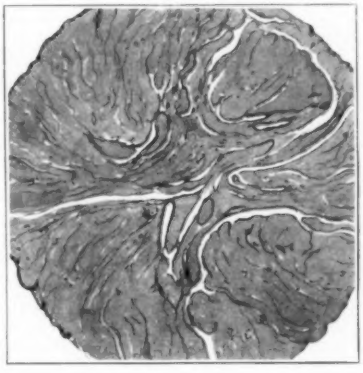


FIG. 8.

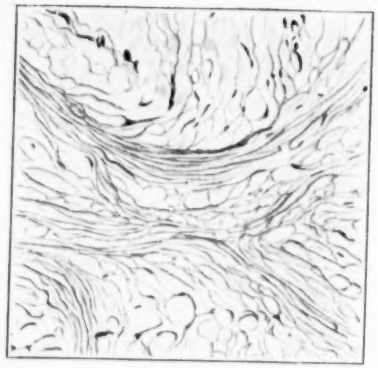


FIG. 9.

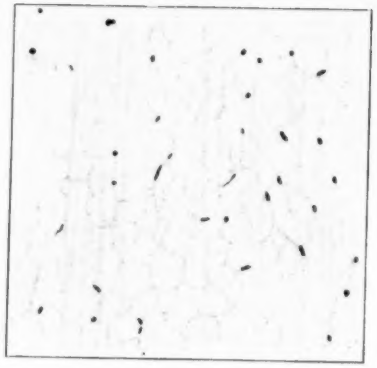


FIG. 10.

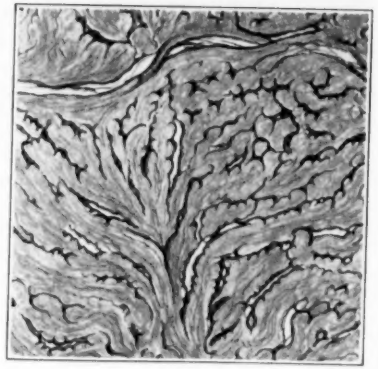


FIG. 11.

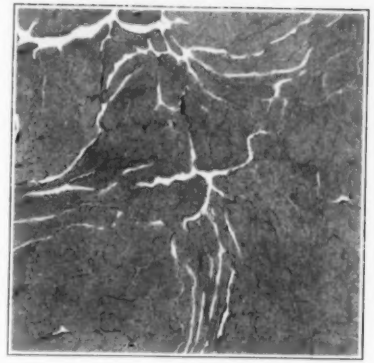


FIG. 12.

FIG. 13.

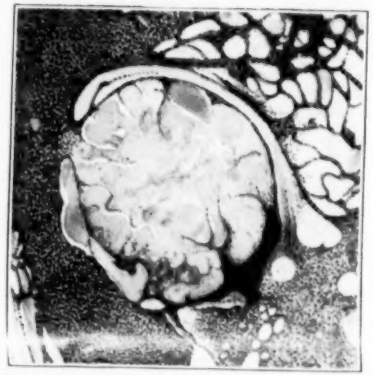


FIG. 14.

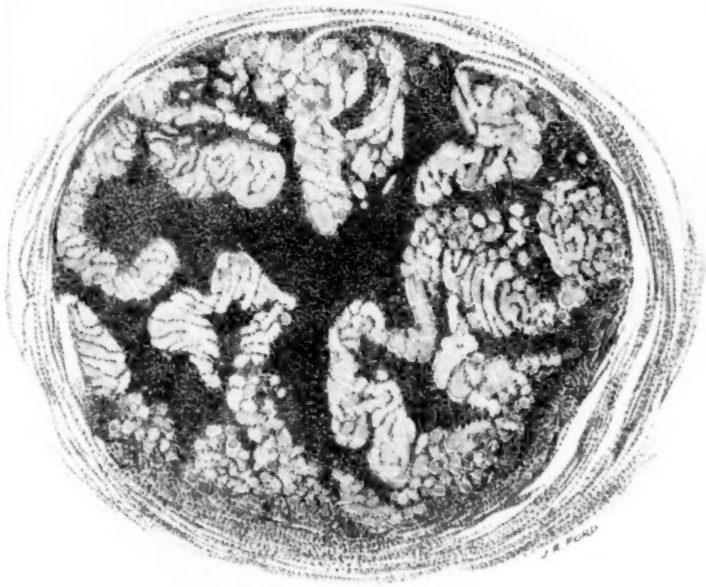


FIG. 15.

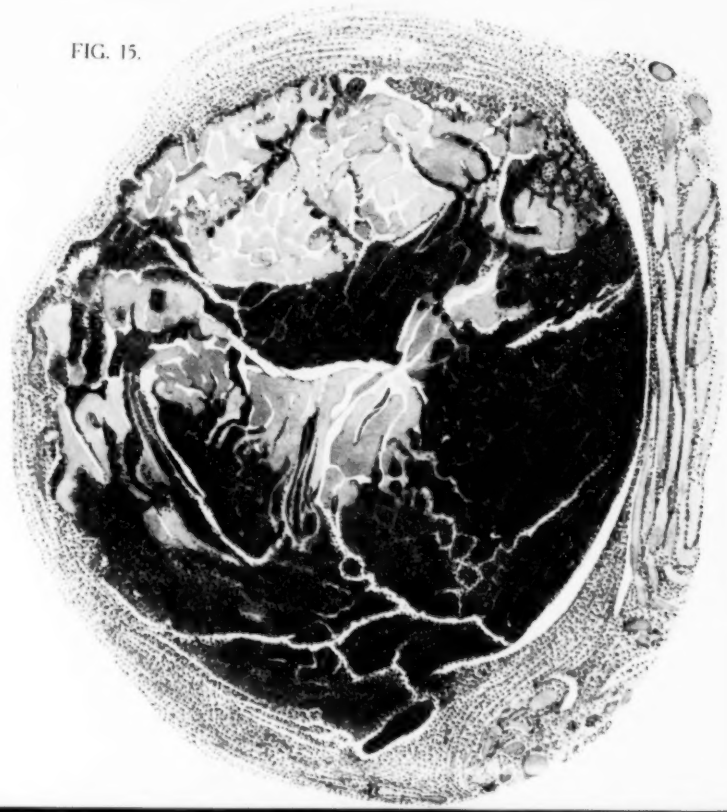


FIG. 16.

FIG. 17.

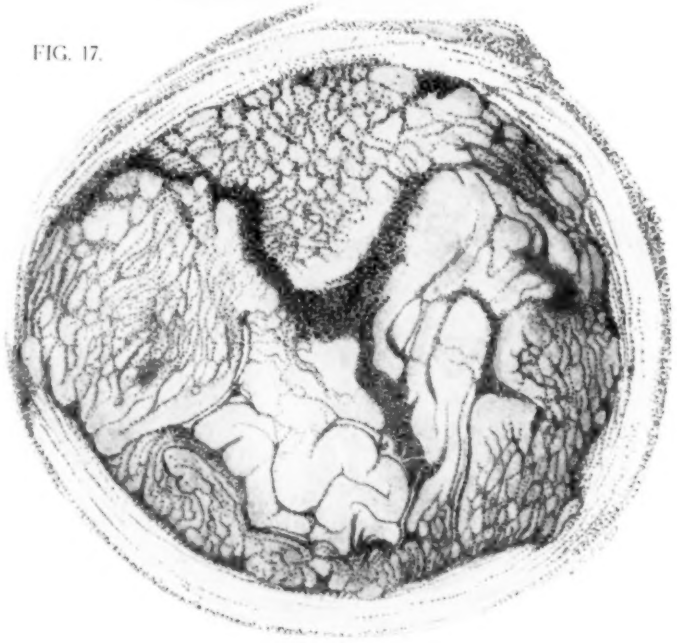


FIG. 18.

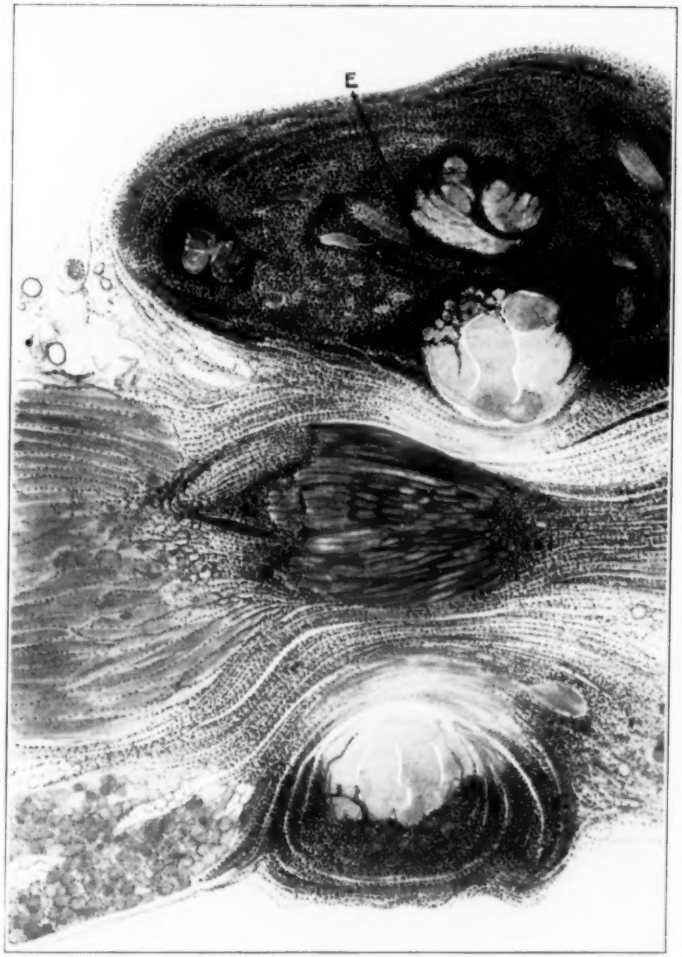


FIG. 19.

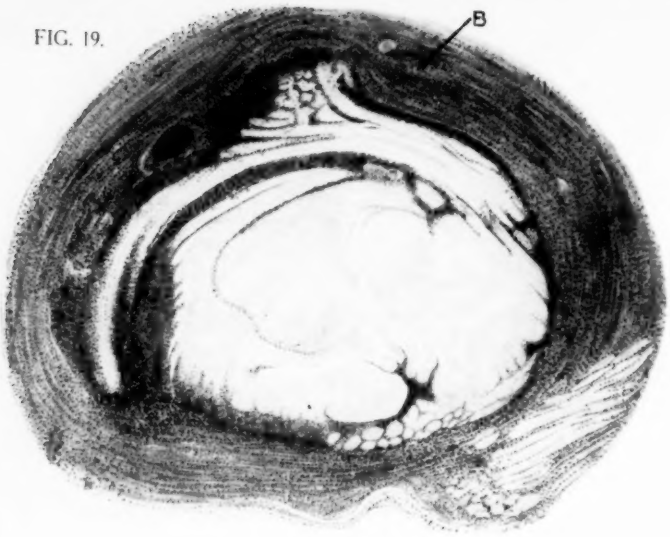


FIG. 20.

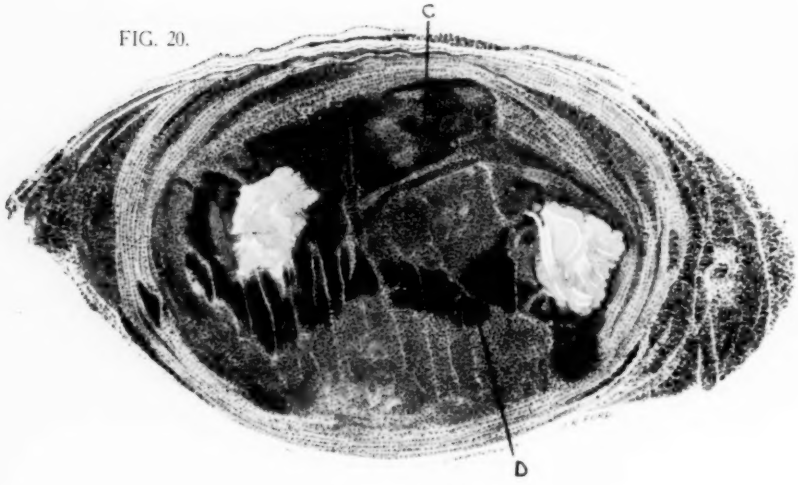


FIG. 21.

FIG. 24.

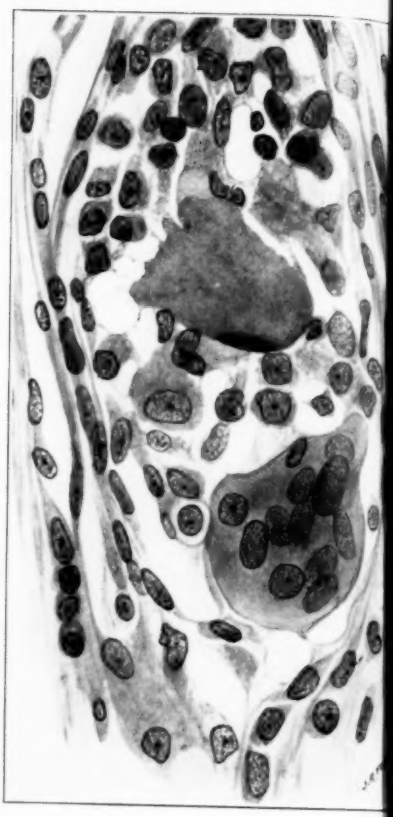
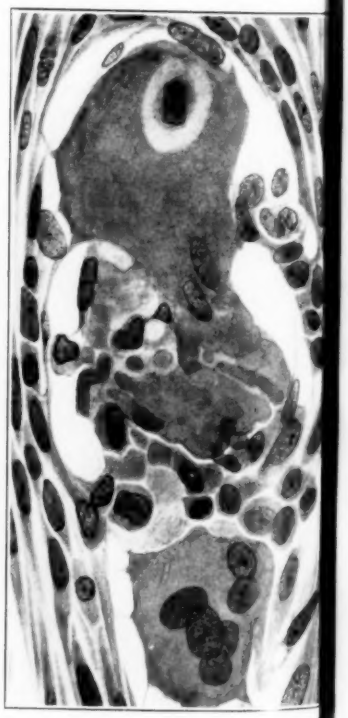


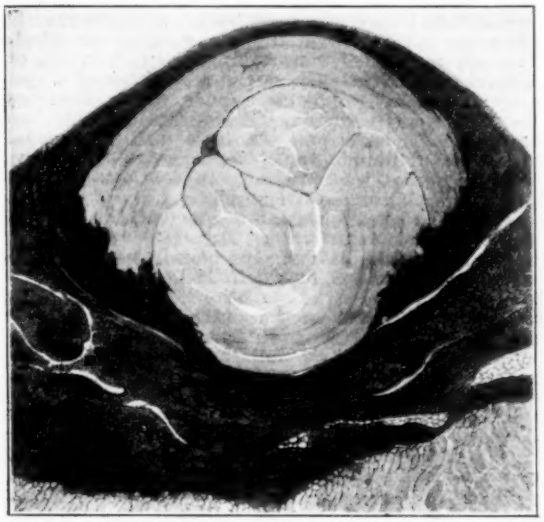
FIG. 25.



appearance and has lost its typical structure. The drawing is taken from a spot in Fig. 19 marked *B*.

FIG. 25.—*A fragment of ox peritoneum ligature encapsuled by young fibrous tissue and undergoing absorption* (× 750)—nine weeks. Within the capsule in the lower part of this drawing is seen a giant cell, and several wide clear spaces are seen external to the fragment of ligature. They

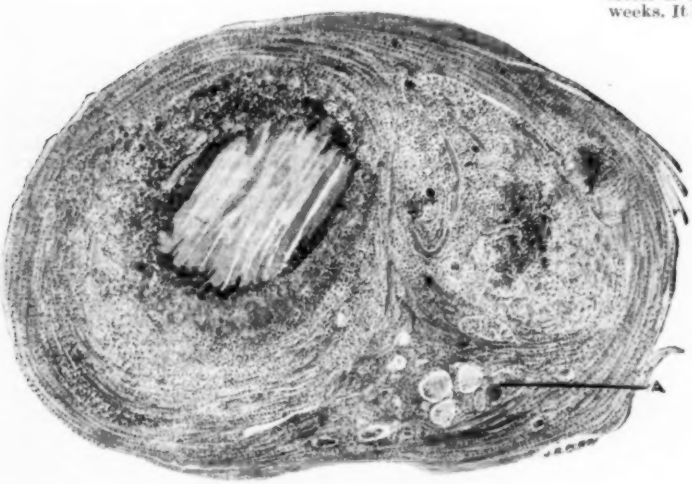
FIG. 22.



may contain a proteolytic ferment (secreted by the cells) in a fluid medium. This would explain the absorption of the ligature material. The lower part of the fragment of ligature still seems to show some faint signs of structure, but this is probably fallacious, the appearances being caused by the lines of absorption. The upper part of the fragment is quite structureless. A light area of absorption is visible around a cell which seems to have embayed itself in the substance of the ligature. The drawing is taken from a spot in Fig. 19 marked *B*.

FIG. 26.—*A giant cell containing in its protoplasm a fragment of ox peritoneum ligature* (× 750)—13 weeks. The proto-

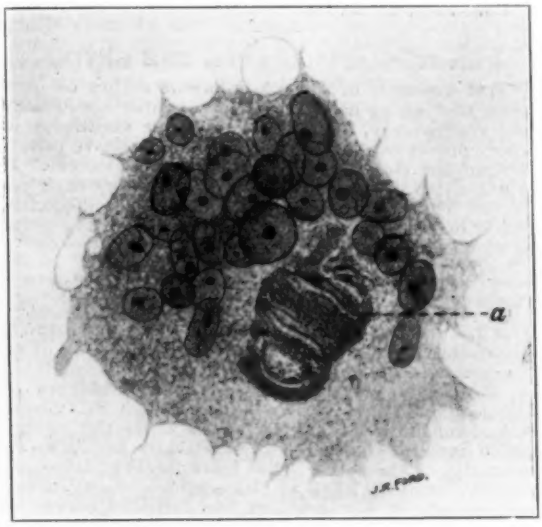
FIG. 23.



plasm of the cell is in close contact with the fragment of ligature (*a*). Several light areas crossing the fragment can be seen where absorption has taken place. They may contain the ferment in a fluid medium, hence the non-necessity, at this stage, of absorption occurring in a "vacuole." All trace of the fibrous structure of the ligature material has been lost. The drawing was made at the place marked *A* in Fig. 23.

FIG. 27.—*Cells digesting ox peritoneum ligature* (× 1100). (I think this is a fair statement, as the ligature is the only material nearby, with the exception, perhaps, of a stray leucocyte or red corpuscle, which the cells could attack and ingest.)

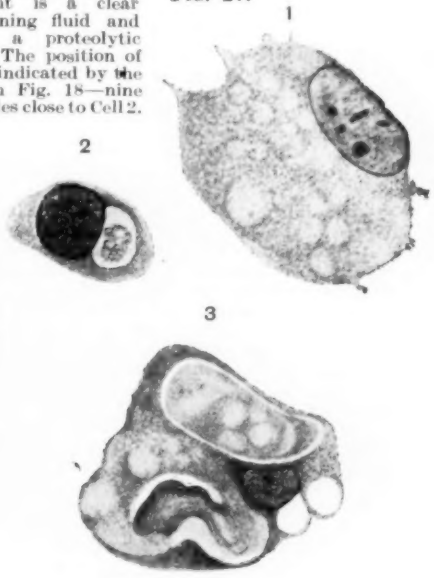
FIG. 26.



1. *A cell with many small fragments of partly dissolved ligature* in its protoplasm. There is no food vacuole visible; possibly it has completed its labours and shed the débris of the digestive process into the surrounding protoplasm. The position of this cell is indicated by the letter *D* in Fig. 20—nine weeks.

2. *A cell in the protoplasm of which can be seen a food vacuole containing the remains of a fragment of ligature.* Around the fragment is a clear space containing fluid and presumably a proteolytic ferment. The position of the cell is indicated by the letter *E* in Fig. 18—nine weeks. It lies close to Cell 2.

FIG. 27.



3. *A cell in the protoplasm of which are two food vacuoles.* In each vacuole is a fragment of ligature as yet not completely digested. Around each fragment is a clear space containing fluid and presumably a proteolytic ferment. The position of this cell is indicated by the letter *E* in Fig. 18—nine weeks.

THE PATHOLOGICAL ACTION OF LIGHT UPON THE EYE.

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PART III.*—ACTION UPON THE RETINA.

THE question of the pathological action of light upon the retina has given rise to much speculation and controversy, and even to-day our knowledge of many points can by no means be said to have passed beyond the stage of uncertainty and conjecture. It is a subject which not only presents many interests in the fields of pure science and applied medicine, but is of importance industrially and from the point of view of general hygiene.

1. *The Energy Incident on the Retina.*

(*a*) *The Nature of the Light Incident on the Retina.*—The nature of the light incident on the retina is determined by the transmission and absorption of all the ocular media. In the upper part of the spectrum in the region of the infra-red, the researches of Hartridge and Hill and Vogt have shown that above wave-lengths of 12,000 Angström units the energy which reaches the retina is practically negligible in quantity. Thereafter the transparency increases rapidly, until at 7000, at the commencement of the visible red, 94 per cent. of the incident energy is transmitted through the ocular media and falls upon the retina. From this point the media may be considered transparent until the lower part of the visible spectrum is reached; here, in the ultra-violet, the commencement of absorption is determined largely by the lens, the albumoid of which is the most powerful absorbent in the path of the light. Spectrograms show that the dividing line here varies with that of the isolated lens, being some 200 A.U. above it (Brücke, Schulek, Hallauer, Shoji); absorption in quantity commences at about 4000 in the adult, and the more recent determinations indicate that light of wave-lengths as low as 3300 reaches the retina (Shoji). Apart from a considerable variation with the intensity of light used, this limit varies largely with the individual; it is raised in age and in the cataractous eye, and in the child the retina receives in appreciable quantity rays well within the limits of abiotic activity (Schanz, Graham). This considerable transparency persists for some time; thus Shoji found that in the infant the lens transmitted light of wave-lengths 3050, at 17 years 3038, and at 23 years of age 3125. The number of investigators who have examined human lenses is small, and the question cannot yet be considered as finally established, but from the information we have it would seem that the human eye is more transparent to the shorter spectrum than that of most laboratory animals. It is of interest to note that in nocturnal animals, as the owl, the eye media transmit the ultra-violet down to 3000.

The limits of transmission in this region of the spectrum may also be deduced from the observation of the lower limit of retinal visibility. The upper end of the spectrum does not lend itself to investigation by this method, since, while the average person cannot appreciate (as red) waves longer than 7500, and the maximum limits recorded are 8350 (Helmholtz) and 8400 (Hertel), we have seen that waves of 12,000 reach the retina; 80 per cent. of the infra-red energy falling upon it is in fact invisible (Vogt). There is good reason to believe, however, that all the shorter waves which can penetrate the media are appreciated visually. The sensation produced has been variously described as indigo or silvery blue (Helmholtz) or silvery grey (Sekulic, Sauer), but the writer prefers to agree with Birch-Hirschfeld in describing it as a lavender grey. It may be that the sensation is due to fluorescence in the retina, although the sharpness of the lines would seem to negative the suggestion; but whether it is or not, the nature of its production does not affect the point at issue. Fluorescence in the lens must, however, be eliminated, as thereby short waves are transformed in part into longer waves, which latter might readily reach the retina, while the former were absorbed. Through neglect of thus taking the precaution of defining retina visibility as the perception of a real spectral line free from fluorescence, many observers are in error (Helmholtz, Edridge-Green, &c.), but the majority have put the limit with the usual intensities of illumination at about 3500. Glancy, however, who took minute precautions against fluorescence, using a very high-tension spark as source, states that, although below 4000 the spectral lines appear much fainter than the spectrogram indicates, yet the 3170 line is plainly visible. The limit varies with age, only 1 in 12 individuals above 50 years being able to see below 3950 (Widmark), while in those in whom the lens has been extracted the limit is lowered considerably, both in wave-length (de Chardonnet) and in visual threshold of intensity for the same wave-length (Birch-Hirschfeld).

We may take it, then, that the retina is reached by practically all the waves between 4000 and 7000 (the visibles), and by a part of those between 7000 and 12,000 (infra-red), and between 4000 and a limit varying about the region of 3200 (long ultra-violet).

(*b*) *Concentration of Energy at the Retina.*—In its passage through the ocular media to the retina a portion of the energy incident on the eye is lost, partly by the specific absorption of the media themselves, and partly by dissipation due to their optical heterogeniety. Calculating from the extensive data of Aschkinass the loss by absorption has been computed by Luckiesh to be 30 per cent. of the total for sources of the nature of the usual artificial illuminants and the sun, which may be considered to be radiometrically equivalent to a black-hot body at 5000° C. absolute. The loss by dissipation, made up of reflected, dispersed, and aberrated rays, may be taken as 10 per cent. Counteracting these two influences, the refraction of the optical system of the eye concentrates the energy to a point on the image on the retina of the emmetrope, a concentration which, when high intensities are involved, may readily produce pathological effects here while leaving the structures in the anterior eye unaffected. In contradistinction to what we have seen to obtain in the consideration of the energy distribution in the lens, since the retinal image of a large body is itself large and widely spread out, for the same total intensity of radiation, the greater the extensity of the source, the smaller the energy concentration at the retina; the main danger to the retina, therefore, lies in sources subtending a small solid angle and radiating with high intensity—e.g., the sun.

2. *Pathological Effects.*

Pathological effects caused by light upon the retina may occur in one of three ways: (1) by over-stimulation and consequent impairment of the physiological mechanism of vision; (2) by thermic action; and (3) by abiotic action.

Since the infra-red rays do not excite the physiological mechanism of vision they cannot over-stimulate it. Any pathological effects which the visible rays (those between 7000 and 4000 A.U.) may cause in the functioning of this mechanism are difficult to assess in the present state of our knowledge, and the old conception of retinal "fatigue" as used by Helmholtz and the earlier writers requires modification. When the dark adapted eye is exposed to light, the light induces a new mechanism of functioning—photopic vision. There is evidence that moderate exposure to bright light increases the retinal excit-

* Parts I. and II. appeared in THE LANCET of June 12th, 19th, and 26th respectively.

ability; but after exposures of the light-adapted eye to high intensities of white or coloured light, the excitability to that light is diminished and that to the complementary colour is enhanced by the process of induction. None of these effects can fairly be called pathological. Prolonged and intense exposures, however, produce changes which, if not definitely of this nature, closely border upon it (Burch), and may be taken to indicate a "physiological fatigue," using the term without prejudice; while, by measuring the critical frequency for the elimination of flicker, Grünbaum has brought forward evidence of a true "optical fatigue." These, however, are only extreme experimental cases, and for all practical purposes retinal fatigue does not exist, and the ordinarily visible spectrum may be taken as exerting no pathological effect upon the physiological mechanism of the retina, although, as will be seen, these rays can produce definitely pathological effects in another way (by thermic action). Excessive light, especially if the peripheral retina is largely stimulated, may also produce the phenomenon of dazzle, by which the sensation is prolonged after the stimulus is withdrawn. The ease with which "fatigue" can be elicited varies with the colour of the light used (Wanach), being least for the more refrangible rays; similarly, the duration of the dazzle sensation varies with the colour, red passes off first, then green, blue, and lastly violet. Excessive contrasts also of light intensity exert a deleterious effect upon vision, a factor which is largely responsible for the unpleasant sensation of glare.

Those rays below 4000—that is, the longer ultra-violet—produce a most unpleasant visual effect, as is experienced on looking directly at a bare arc or at a mercury-vapour lamp. The former, with its large proportion of highly luminous waves, cannot easily be looked at for long. Fixation of the mercury-vapour lamp for two minutes produces at the time and for a considerable period afterwards an annoying and uncomfortable effect visually and psychically, and a curious general feeling of weirdness and uncanniness. It is difficult to appreciate details, and a central luminous fog floats before the eyes which may persist for some time, or an absolute or relative scotoma develops. This central fog diminishes the visual acuity considerably; it tends to float about, and, curiously, may sometimes be dodged when the visual acuity appears almost normal for a moment. The lack of fixation which it induces, with the consequent effort to maintain it, seems largely responsible for a feeling of fatigue which quickly develops. Erythropsia ("red vision") readily appears after removing the eyes and persists up to two minutes, and is usually followed by a distinct xanthopsia ("yellow vision"). For some considerable time afterwards there is a marked diminution in the power of adaptation, vision in the dark is lowered, night-blindness virtually coming on, and in the sunlight everything takes on a grey tint. *Erythropsia* is a condition wherein everything seems to be tinged with red. It occurs after exposure of the retina to intense light, particularly to light rich in the shorter spectral waves, as, for example, after looking at an arc or after exposure to a flash of lightning, or to the light reflected from a snow-field. It occurs more readily when the pupils are dilated, and is especially common after cataract extraction, and sometimes occurs normally on waking first thing in the morning. It may last a very variable time, and the tint of redness varies.

To be distinguished from true "photo-erythropsia" is a similar condition which is said to occur as a neurosis (Wydler), as also is the red vision after a trauma when the eye is filled with blood, or the red tinge which sometimes comes over black print when reading with strong lateral illumination—a phenomenon which is caused by the light passing through the sclera and the blood-containing chorioid.

The nature of erythropsia has not definitely been cleared up, but it is more probably a subjective phenomenon rather than a pathological condition, and depends upon induction. The earliest theories of its origin may be dismissed—the light passing through the lids and becoming coloured with blood (Snellen, Koster), and the entoptic vision of the visual purple (Fuchs). Since it is more readily produced by short-waved light, and since it occurs especially after cataract extraction when that light has better access to the retina, Birch-Hirschfeld and Schanz advanced the theory that it was due to ultra-violet rays. Vogt has, however, shown that the phenomenon can be produced by light of any wave-length, that the most effective wave-lengths were 5000 to 5700 A.U., that it occurred readily when the ultra-violet was filtered off, and that it could in no circumstances be produced in the normal eye with ultra-violet light alone. Brücke showed that the retina was normally adapted for red, and the findings of Burch have already been mentioned—that after "fatigue" of the retina, recovery comes in the order, first red, then green, and lastly blue. Therefore, on stimulating with mixed (white) light, the red phase of the negative after-image will predominate (Wydler), and when the stimulating light predominates in the shorter blue and violet waves, owing to the unequal "fatigue" of the primary colour sensations, the red phase will be much more pronounced. Such an explanation will account for the partial erythropsia which occurs on unequal retinal stimulation (Purtscher) and paves the way for an explanation of the xanthopsia which so often follows it. In the cataractous eye it is the long red waves which get through the opaque lens in the highest proportion, the short blue and violet are largely dispersed; the retina in these cases is, therefore, more than usually red-adapted, and when the cataract is extracted and the retina flooded with short-waved light, an additional element—the "fatigue of disuse"—affecting the lower spectrum will further intensify the red after-image.

Apart from these physiological effects there is no evidence that incident light has any specific effect on the retina as on the other body tissues, beyond a thermic or abiotic action depending on length of wave.

Thermal Effects.—The greater part of all energy incident on the retina is absorbed by the pigment in its posterior layers and degraded into heat. Thermal lesions are, therefore, easily produced experimentally, and have been studied in animals by a large number of observers—Czerny (1867), Deutschmann (1882), Widmark (1892), Herrnheiser (1896), Aubaret (1907), Birch-Hirschfeld (1912), and Verhoeff and Bell (1916). When the lesion is on the disc there may be an intense hæmorrhagic retinitis, due to thrombosis of the central vessels. Elsewhere on the retina, corresponding to the site of the image, the lesion appears as a small red spot, due to chorioidal congestion, localised and sharply defined, demonstrating the necessity for the attainment of a critical temperature to effect tissue destruction. Microscopic examination shows that the greatest severity affects the pigment layer where the heat is absorbed; the cells of this layer show fragmentation and vacuolisation of the cytoplasm, and finally break up altogether and disappear leaving only the pigment. Thereafter follow in intensity the layers in order as they are affected by conduction from the pigment layer: the rods and cones, which become swollen and granular, and the chorio-capillaris where there is intense local hyperæmia, with extravasations of blood. The nuclear layers, the ganglion layer, and the nerve-fibre layer are only affected when the deeper layers are entirely disintegrated, and are represented by pigment alone. Some days later the retina is seen to be entirely disorganised, or to be fixed by heat coagulation: while after some months the retina is represented locally by neuroglia containing pigment, and the chorioid by a vascular fibrous tissue.

Abiotic Action.—Since only the longer ultra-violet rays can reach the retina, it would seem improbable that any marked abiotic effect could be produced; but although several observers have failed to obtain them (Czerny, Deutschmann, Ogneff, Bach, Verhoeff and Bell), definite abiotic lesions have been described by Strebel, Kiribuchi, de Ridder, and Birch-Hirschfeld. The lesion, in contradistinction to that caused by heat, attacks primarily the most anterior

layers. Chromatolysis and vacuole formation has been described in the ganglion cells, and loss of chromatin in both nuclear layers, while the deeper layers are unaffected; Mettey has described atrophic changes in the optic nerve. The changes observed by the writer have always been very slight, so slight as to seem within the physiological variation of the normal rabbit's retina after being subjected to cutting and staining. The exposures given were, however, never more than 30 minutes duration, while Birch-Hirschfeld, who has described these lesions most confidently, subjected his animals to radiations lasting for periods up to six hours. This difficulty in producing abiotic pathological changes here agrees with the negative nndings of Verhoeff and Bell, who experimented on monkeys, and in one case on a woman the day before excision of the eye for carcinoma of the lid. It seems reasonably certain, therefore, that the retina is adequately protected by the ocular media from abiotic rays under all ordinary circumstances; but it is probable that extreme exposures for long periods may injure it, and the possibility of ultimate damage from exposures of less extreme intensity but over periods lasting many years is not without the bounds of possibility. The above pathological changes are obtained much more readily and to a much more marked degree in the lensless eye; experimentally they are produced in the aphakic rabbit after exposures which leave the retina of the normal animal unaffected (Birch-Hirschfeld, Schulek).

Clinical Occurrence of Retinal Lesions.

Sun Blindness.—Visual disturbances from looking at the sun have been known and recognised for a very long time. Plato refers to them in his Phaedo; Galileo, looking at the sun with his telescope, injured his eyes; and Galen describes the symptoms in De usu Partium. Reid, in 1761, appears to have recorded the first clinical description, and Dufour, in 1882, was the first to describe accurately the ophthalmoscopic appearances of the lesions.

The sun may be considered from the radiometric point of view as a black-hot body at 5000° C. absolute, and the energy available in its radiations has been computed to be about 1,000,000 erg-secs. per sq. cm. at the earth's surface (Verhoeff and Bell). If the pupil is strongly contracted to about 2 mm., as it would be on observing it directly, about 3 per cent. of this energy will enter the eye, and since slightly over 30 per cent. of that entering is lost in its passage through the eye, the energy available at the retina will be of the order of 20,000 erg-secs. per sq. cm.; if the size of the image is 0·15 mm., this will entail a concentration of energy here of the order of 113,000,000 erg-secs. per sq. cm.—quite enough to produce a severe lesion in a very short time. Ordinarily, when we look at the sun directly we are only protected from injury by the fleeting duration of the glance, and by the great lack of fixation which distributes the energy accumulation at any one part of the retina; only on unusually determined fixation is injury sustained. Every eclipse has brought to light a number of such cases, and the name "eclipse blindness" usually applied to the condition is, therefore, appropriate.

The greater part of the infra-red in the solar spectrum is absorbed by the moisture of the atmosphere, and the ultra-violet moiety of the total energy reaching the earth is comparatively small. Experimentally, the typical lesions of eclipse blindness have been produced by filtering out the infra-red by a layer of water (Deutschmann) or of a solution of ferrous sulphate which is strongly adiathermic, and also by eliminating the ultra-violet below 4000 by the interposition of Schott's heavy flint glass; while uviol glass, which obstructs the visibles but allows the passage of ultra-violet affords complete protection (Best). The lesion is therefore due mainly to the luminous waves. It is to be remembered that the maximum of the solar energy intensity is near the shorter visibles in the blue-green (4700–5000 A.U.), and that therefore where the sun is the source, the greatest energy intensity, and therefore the greatest heat effect, is produced by these rays.

The lesion is a purely thermal effect, corresponding to that already described as obtained experimentally. The subjective symptoms are a diminution of visual acuity, sometimes to 6/60 or less, but usually to about the level 6/12; the perception of a diffuse cloud before the eyes, which often shows rotatory movements and may be worse in bright light; a scotoma; and often metamorphopsia. The scotoma is central, is usually absolute but often relative, or may be initially absolute and later become relative, or absolute centrally surrounded by a ring zone of a relative nature; it does not accurately correspond to the image of the sun owing to the lack of fixation spreading the affected area irregularly; in some weeks it tends to contract, but it often is persistent. Erythropsia occurs rarely. Ophthalmoscopically, there is originally a small red spot at the macula due to chorioidal congestion, which may be accompanied by general hyperæmia, œdema, and hæmorrhages. Small irregular pigment spots frequently remain at the macula, indicating definite and permanent destructive lesions, while macular holes have been observed (Lasarev). Rare complications are obstruction of the central vessels (Batten, Walker), hæmorrhagic retinitis (Leber, Bokenham), retrobulbar neuritis (Collins, Menacho), and optic atrophy (Ulbrich).

Similar symptoms with similar retinal changes have been described as occurring in a milder form in bright weather when the sun is not directly regarded, as the case reported by Lawson wherein they developed after a day's golf and were followed by permanent fine macular spots. Dark people are more susceptible than fair, owing to the larger amount of absorbing pigment in the former, while hypermetropes show a much higher incidence in the literature than those of normal or myopic refraction. The concentrating effect of strong convex spectacles in the hypermetrope may predispose to injury, and symptoms have been reported after the prolonged use of field glasses on a sunny day (Lawson).

Whether or not prolonged exposures to light lasting over years have an injurious effect on the retina by a cumulative action is an open question, and one which, by its nature, is very difficult to answer with any degree of certainty. It is improbable that any such effect could be due to a thermal lesion, as is eclipse blindness, for at any one time a critical temperature must be attained to produce any destructive effect, and with intermittent exposures the temperature effect is nullified in the intervals of cooling, and a cumulative action, therefore, cannot be obtained. Diffuse daylight and all ordinary illuminants, therefore, can have no ultimate thermal effect on the retina. With the short rays, however, the case is different, since the latent period of abiotic action extends up to about 24 hours, and a cumulative action can therefore be produced by exposures on successive days even although separated by intervals of sleep. We have seen that the experimental production of such lesions is very difficult, owing to the high degree to which these rays are absorbed in the media of the eye before they can reach the retina, but the factor of small amounts of damage accruing over many years is certainly one to be considered. Thus, accompanying the photophthalmic symptoms met with in snow-fields, Widmark records the occurrence of amblyopia, and Birch-Hirschfeld a scotoma for red and green, and ophthalmoscopically a hyperæmia of the retina and disc may occur (Reich). Van der Hoeve has suggested that ordinary daylight, acting less intensively, and over indefinitely long periods of time, may be the cause of senile macular degeneration. His thesis is based largely on the evidence that his statistical studies show that this retinal disease appears in its incidence to be antagonistic to cataract; the short waves of light (he argues) cause cataract by impairing the nutrition of the lens through an indirect effect on the ciliary body, and the lens having become less transparent, the retina is protected from the short wave-lengths, and macular degeneration does not

readily develop; if, however, the lens remains transparent, the actinic rays pass through, and are thus able to exert a harmful effect on the retina. Gjessing has recently confirmed van der Hoeve's statistics; but although it may be considered as probably established that the two diseases do not often occur together, statistical evidence of this kind is, when taken by itself, somewhat unconvincing, and very often lends itself to misinterpretation. The most that can be said at the present time is that the matter is still open, and the theory certainly unproven.

Industrially, while all intense illuminants give rise to the subjective symptoms already mentioned, the cases of actual retinal injury are rare. After exposure to arc lights and in electric welding diminution of vision, contraction of the visual field, and scotomata are relatively common, while erythropsia and xanthopsia occur more rarely; objectively there have been reported œdema of the retina (Little), pallor of the disc (Valois), and macular changes (Lubinski). These findings are, however, exceptional, and the naked arc can be fixed for several minutes without any damage being done to the retina beyond temporary impairment and derangement of vision. The flash of the short-circuiting of a high-tension current almost always gives rise to the characteristic visual disturbances, which are usually temporary, but on occasion have remained over indefinitely long periods of time; haziness of the disc margins (Terrien) and macular (Haab) and chorio-retinal changes (Uhthoff, Kramer, Bettremieu, Knapp) have been described. These latter appear as small pigmented areas, and are without doubt the cicatrices of thermal lesions caused by the longer wave-lengths of the very wide range of radiations emitted by these sources. Similar thermic retinal lesions after exposure to a lightning flash have been reported by Le Roux and Renaud and Oliver.

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OBSERVATIONS ON CHOLECYSTOGRAPHY.

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THE introduction of tetra-halogen compounds of phenolphthalein has made it possible to obtain useful data concerning the functions of the liver and biliary tract, both in health and disease.

As is well known, these compounds have been used in two ways: (1) Tetrachlorphenolphthalein has been administered intravenously and the rate of its elimination into the bile has been utilised as a measure of the functional capacity of the liver. (2) The tetrabrom and tetraiodo compounds have been administered either intravenously or orally, and the subsequent opacity of the gall-bladder has been utilised for studying the size, appearance, and possible distortion of that organ.

One of us (T. I. B.) has made a series of experiments with a view to determining whether these two types of observation could not be made simultaneously. Samples of various compounds have been administered both orally and intravenously to guinea-pigs and to rabbits, but it has been found that, whereas the tetrachlor compound is a dye which colours the blood serum sufficiently to make estimations of its concentration easy, the tetraiodo and tetrabrom compounds produce no such marked effect.

Conversely, the relatively low atomic weight of the tetrachlor compound makes it useless for radiographic purposes, and even by radiograms of recently removed livers from animals to whom it has been administered in full doses no X ray shadows of the gall-bladder or bile-ducts were obtained. In these circumstances, we decided to postpone attempts to study series of phenomena simultaneously and concentrated our attention on cholecystography.

The toxicity of these substances to the tissues is reported to have led to the production of sloughing, when even a few drops have escaped locally during intravenous injection. The risks of such accidents are not great, but, as the test is a diagnostic one only, the possibility of such an occurrence makes the oral method of administration greatly preferable. We have therefore confined our study to the oral

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method, and are able to confirm the favourable reports published by other observers.

At the outset we tested a series of samples from various sources, both of tetrabromphenolphthalein and tetraiodophenolphthalein, but whether owing to their chemical composition or to the manner in which they were supplied for use (gelatin capsules, &c.) our results were uniformly negative. Finally, we secured a supply of the tetraiodo compound prepared in America by the Malinkrodt Chemical Works under the name of iodeikon. With this we have had good results.

Method.

The patient is prepared as for an ordinary skiagram of the gall-bladder. An ounce of castor oil is given on one night and ½ oz. the next night. On the following day a light breakfast and a very light lunch are permitted and an ordinary skiagram of the gall-bladder taken in the afternoon. Tea and bread-and-butter are permitted on the same day, and at 12 midnight another small meal is taken, during which the capsules of iodeikon are swallowed. On the following morning the patient has a cup of tea only for breakfast and is X rayed at 10 A.M., 2.30 P.M., and 4.30 P.M. This scheme has been gradually evolved to suit all parties concerned. The dose of dye employed has usually been 5 g., although, if the patient weighs under 100 lb., this is reduced to 4 g. It is given in capsules each containing ½ g.

At the outset of our investigations difficulties were encountered owing to the methods in which the capsules were prepared. If a readily digested covering, such as gelatin, is used, in a large proportion of cases the dye is liberated in the stomach; an insoluble hydrochloride is then formed and vomiting usually follows, practically the whole of the dye being thus rejected. If, on the other hand, salol is employed, the pills are often so resistant to digestion that they may pass through the cæcum, and, in consequence, no absorption of dye occurs.

Success depends upon the liberation of the dye in the upper part of the small intestine, but not in the stomach, and it appears clear that, as there is considerable variation in the strength of the gastric and pancreatic digestive juices in different individuals, it is almost impossible to devise a capsule which will not be too readily digested by some and too resistant to the digestive juices of others.

With the assistance of Messrs. Allen and Hanburys, we finally secured a formalised gelatin capsule which has given almost uniformly successful results; it must be freshly prepared, however, because, if kept more than 24 hours, it becomes too tough for proper digestion.

Analysis of Fifty-eight Cases of Cholecystography.

Cases 1–4 inclusive were given sodium tetrabromphenolphthalein in cachets. No results were obtained. The remaining 5–58 inclusive were given sodium tetraiodophenolphthalein, mostly in formalised gelatin capsules. In a few cases salol-coated pills were used.

Results.

1. *Normal gall-bladder shadows obtained after giving dye.* Twelve cases. Of these, ten were not operated upon, and were either in the nature of control cases, or else the test was used to exclude disease of the gall-bladder, while, in the remaining two cases, operation or autopsy confirmed the normal state of the gall-bladder.

2. *Faint shadows of gall-bladder obtained after giving dye.* Ten cases. Of these, in two cases a pathological gall-bladder was found at operation, a normal gall-bladder in one case, in one case vomiting had occurred soon after giving the dye, and in six cases no operation has been performed. Many of these cases came early in the series, before the importance of having freshly prepared capsules was realised.

3. *Mottled shadows of gall-bladder obtained after giving dye.* Three cases. In all three cases a pathological gall-bladder containing stones was found at operation.

4. *No shadow of gall-bladder obtained and no evidence of unabsorbed dye.* Twenty cases. Of these cases, in four a stone was found at operation to be blocking the cystic duct, in another six the gall-bladder was pathological and contained stones, in three cases there was disease of the duodenum near the ampulla of Vater (ulcer and malignant disease), while in the remaining seven cases two vomited severely after receiving the dye and in five no operation has been performed.

5. *No shadow of gall-bladder obtained, but unabsorbed dye seen in the alimentary canal.* Five cases.

The remaining four cases of the 54 in this series are accounted for as follows: Two are awaiting operation. One patient was very neurotic and unable to swallow the capsules. One of the cases represents a repeat, and is included only once.

Summary and Conclusions.

From the results here analysed the following points emerge:—

1. The importance of taking a skiagram before the administration of the dye has not hitherto been sufficiently emphasised. In the first place it must be remembered that the gall-bladder may give a definite shadow in this preliminary plate. If, after administration of the dye, there is no increase in the density of this shadow, it is evidence that no dye has entered the gall-bladder, a deduction which would not have been possible without the preliminary skiagram.

2. If there is some pathological condition present, not, however, amounting to complete obstruction of the cystic duct, the opacity caused by a limited amount of dye entering the gall-bladder, plus the original density caused by the gall-bladder itself, if such has been found in the preliminary skiagram, may give the appearance of the opaque shadow of the normal cholecystogram.

3. Certain other shadows, such as those of renal calculi, calcified glands, or areas of calcification in the costal cartilages, may also be present, and are less likely to lead to erroneous deductions if seen clearly in the preliminary plate.

4. When definite gall-stone shadows are seen before the administration of the dye there is no need to continue with cholecystography. But if certain vague shadows in the preliminary plate are seen to coincide in position with a patchy gall-bladder shadow after administration of the dye, it is strong confirmatory evidence of their nature.

5. It is most important to observe the alimentary canal, and especially the cæcum, for evidence of unabsorbed dye. If this is not found and the gall-bladder does not fill up with dye, it is a fair assumption that there is some pathological condition of the gall-bladder or ducts present. In one case of duodenal ulcer with pyloric stenosis, the capsules were all held up in the stomach where a dense shadow of conglomerated capsules could be seen. The dye was obviously not absorbed, and hence absence of a gall-bladder shadow in this case was of no significance. The importance of securing proper absorption of the dye cannot be over-estimated, because the first postulate of the method is that *a negative result implies gross disease of the gall-bladder*, and, if this negative result is due to failure of absorption following imperfect technique, most serious errors may result. The only possible exception to this rule occurs when there is present advanced and widespread disease of the liver. In one of our cases no gall-bladder shadow was obtained and no unabsorbed dye could be seen in any part of the alimentary canal. At autopsy a few weeks later the gall-bladder and ducts were found to be normal, but there was very advanced cirrhosis of the liver.

6. In examining the shadows of the gall-bladder, attention should be given to the variations in size and density on the series of films. A healthy gall-bladder may cast a surprisingly large shadow, but

there should, in the second film, be a distinct diminution in this size with an increase of density due to concentration of contents and contraction of the walls of the gall-bladder, which are the normal functions of the non-infected organ.

7. It is the custom of many American observers, in all cases of doubt, to follow the oral administration with an intravenous one. If a non-toxic compound can be introduced this will undoubtedly be an improvement. At present the oral method by itself is very satisfactory in the great majority of cases; it is easy and safe and we have experienced no difficulty in employing it both for out-patients and in-patients. Vomiting occurred in three cases only, slight regurgitation in two others, and trivial nausea in one or two. In no case were any toxic symptoms observed.

Our thanks are due to those physicians and surgeons who submitted cases for investigation; we have also had most useful help from Messrs. Allen and Hanburys in the preparation of the capsules. The expenses of one of us (T. I. B.) were partly defrayed by a Government grant, made on the recommendation of the Royal Society.

This paper forms a part of a report to the Medical Research Council.

Clinical and Laboratory Notes.

A CASE OF MEASLES SHOWING UNUSUAL NERVOUS SYMPTOMS.

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THE following case of measles showing unusual nervous symptoms appears worthy of record.

J. W., a boy, aged 6½ years, was admitted to the Borough Hospital on the morning of Jan. 18th, 1926, in a semi-conscious state. About a week previously he had developed signs of a cold in the head with fever and coughing, a typical measles rash appearing four days later. The night before admission he was noticed to be sleeping heavily, could be roused with difficulty, and appeared semi-conscious. He had been quite well prior to his present illness, was intelligent, and had never suffered from fits; there was no history of epilepsy in the family.

On admission he was very irritable, crying out from time to time, could not answer questions, and resented examination, being roused with difficulty. The face was flushed, the mouth very sore, and tongue dry and coated. Respirations were increased, but no adventitious signs elicited in chest, the heart action being rapid and weak, temperature 101·6° F. General mottling of the skin was observed, due to a faded measles rash. The pupils were large, equal, and fixed, with slight conjunctivitis; no rigidity of neck or limbs was present; the knee-jerks were normal, but no plantar reflex was obtained, though a bilateral Kernig's sign was noted. He had marked difficulty in swallowing and obstinate constipation.

On the afternoon of admission the boy had five fits, lasting between 10 and 15 minutes. During these he became very cyanosed, ground his teeth, and had twitchings of right side of face, right arm and leg, whilst the left side of the body was held rigid. He was incontinent both of urine and fæces; the pupils were dilated and fixed. After each fit there was general muscular relaxation, the patient lying curled up in bed, crying out and becoming very restless from time to time. At 6 P.M. he vomited some brownish fluid. On lumbar puncture, performed on the evening of admission, the cerebro-spinal fluid was under slightly increased pressure and slightly turbid. On examination it did not reduce Fehling's solution; there was marked increase of polymorphonuclear cells; no bacteria seen; the fluid remained sterile on culture. The boy was very restless and moaning during the night of Jan. 18th, having two further similar seizures between 10 P.M. and 4 A.M., with incontinence both during and after them. On the morning of Jan. 19th he appeared more conscious, though unable to speak or answer questions and resenting examination. He was very restless and cried out from time to time. Temperature was 99·8°, his colour still poor. In the evening he became quieter, could swallow more easily, and answer questions; his pupils were equal, reacting to light and accommodation, and he appeared quite conscious.

From this time onwards the boy's condition steadily improved. He had no further seizures, but still resented examination, being disinclined to speak or take food and being incontinent at times. He was still restless at night. His temperature became normal on Jan. 21st, remaining down subsequently. By Jan. 24th he was convalescent, but appeared very emotional, mentally dull, and dazed at times. He got up for the first time on Feb. 1st, being still dull, and hesitating when answering questions. He had no recollection of being brought to hospital or what had happened during his stay there. He was discharged on Feb. 9th.

The points of interest in this case are the nervous complications, with marked meningeal symptoms, fits, and Kernig's signs, all very uncommon in measles. In meningism occurring in the course of acute specific fevers, Kernig's sign is usually absent, and the cerebro-spinal fluid, though it may be under pressure, does not show an excess of cells as occurred in this case. The character of the cerebro-spinal fluid obtained was similar to that seen in acute meningitis, but unlike this disease, there was rapid improvement with loss of meningeal symptoms within 48 hours of their onset, the temperature never rising above 100° except on the day of admission, and coming down to normal after four days.

I wish to thank Dr. H. P. Newsholme, medical officer of health for Croydon, for permission to publish this case.

A CASE OF RENAL CALCULUS.

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THIS case seems to be interesting in that so large a number of stones was removed so successfully, under most difficult circumstances, in a moffussil dispensary.

The patient was admitted in the branch dispensary of this State under a sub-assistant surgeon. There was an abscess in the right lumbar region. The doctor, thinking it to be a simple abscess, opened it and during the discharge of pus he detected to his astonishment two stones coming out. He dressed the case for about a fortnight, but finding no improvement sent the patient to me at the main hospital of this State. I diagnosed it to be a case of perinephric abscess secondary to renal calculus.

I tried to dissect out the kidney by the lumbar route. After the usual skin incision, I found the surrounding fascia and muscles so adherent that it was not possible to separate them from each other. I followed the sinuses formed by the passage of the stones and, working with my finger, I reached the stone cavity in the kidney, gradually removing all the sloughs and decomposed tissues on the way. I found there were two sinuses joining the kidney cavity, one reaching from the surface straight down to the kidney and the other taking a curve upwards and outwards and then a little forwards, thus reaching the kidney. There were two stones at the mouth of each sinus. In the first one there was a large branched calculus firmly held in the calyces of the pelvis. I loosened the stone in its bed by passing my index-finger all round it and delivered it with a stone forceps just as the head of a child is delivered by midwifery forceps, because there was very little space to work out the stone forceps. After its removal 14 more stones were delivered by the index-finger. The stone occupying the mouth of the other sinus was also fairly big and took about an hour to remove with the finger, as the curvature of the sinus was such that no forceps could work, neither could the wound be enlarged without unnecessarily cutting the muscles in several directions.

In all 18 stones were removed from this patient. For the last three months he has been in the hospital, the sinuses are almost filled up now, and the patient's health has much improved, though he still complains of a little pain over the upper pole of the right kidney.

FRACTURE OF THE ANATOMICAL NECK OF HUMERUS WITHOUT APPARENT DIRECT VIOLENCE.

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THE patient, a farmer, aged 38, dislocated his right shoulder some six or seven years ago while in an epileptic fit. I reduced it, and the normal function of the joint was regained. On Jan. 19th, 1924, I received a message to say he had again put his shoulder out. On reaching the house I found him lying on his back on the floor. His wife told me that, feeling a fit coming on, he promptly lay down. As the fit developed he stretched his arms straight down by his side with his muscles in tense contraction. The wife said she then heard a click, which told her he had again dislocated his shoulder. The patient, she insisted, never fell, but had lain down quickly, as was his custom, and received no blow of any kind. As the joint appeared to be dislocated, I proceeded to reduce it under chloroform, and on manipulating it I felt crepitus, and could not completely correct the deformity. Examination under X rays two days afterwards revealed fracture of the anatomical neck. This was confirmed when I operated a week later and removed the fragments, which were loose within the capsule. There was no injury to the glenoid. The wife is an observant and intelligent woman, and her statement that there was no direct violence can be accepted. How, then, was the fracture caused?

The patient has now a good range of movement at his shoulder, and is able to do all his work.

Medical Societies.

RESEARCH DEFENCE SOCIETY:

ADDRESS BY DR. J. A. MURRAY.

THE annual meeting of this Society was held on June 25th at the rooms of the Medical Society of London, Lord LAMINGTON, the President, occupying the chair.

The PRESIDENT referred to the sense of loss and sorrow felt by those responsible for carrying on the Society's work at the death of Mr. Stephen Paget. The Society owed its inception entirely to Mr. Paget, and it was he who had safeguarded its interests during difficult times.

Lord KNUTSFORD said that this was the first meeting the Society had ever held without the presence of Mr. Paget. Although sometimes misrepresented by those who opposed him, Paget's activities were due not to a love of controversy, but to his hatred of everything which savoured of untruth and misrepresentation. The committee had decided to establish a Stephen Paget Lectureship at various universities and seats of learning, and it was hoped to send a good speaker, every year or every second year, to different centres in memory of his work.

At the end of the business meeting Dr. J. A. MURRAY gave an address on the

Experimental Attack on Cancer Problems.

The experimental study of cancer, he said, was started 25 years ago, and its progress could be conveniently divided into three periods. The first embraced the work of Jensen and Borrel on transplantation of animal tumours; the second was that in which Fibiger, Yamagiwa and others produced cancer de novo in normal animals; while the third period was that in which the possibility of a microbic origin was worked at by Peyton Rous, Blumenthal, Gye, and Barnard.

Jensen and Borrel, he said, showed that cancerous growths in tame white mice could be propagated in series in normal animals of the same kind by introducing fragments of the original growth under the skin, and Bashford showed that cancer in mice presented all the features of the malignant new growth of man and the larger domestic animals, features also reproduced in the course of the propagated tumours obtained by transplantation. It became evident that the cancer cell behaved as it did because of differences inherent in it or permanently imposed on it, not because of constitutional peculiarities of the individual in which the growth had arisen. Jensen found that animals in which a first transplantation had failed were resistant to a second grafting. Lumsden had recently shown that a serum against rat sarcoma could be produced in the rabbit, and under certain conditions this serum was found to have a curative action.

Dealing with the second of his periods, Dr. Murray referred to the forms of cancer which followed long-continued irritation. Prof. Yamagiwa, of Tokyo, painted rabbits' ears with tar week after week for long periods, and in some instances growths resulted which continued to grow after the tarring had been discontinued, and in a few of these cases metastases were observed in lymph-nodes. These growths produced by tarring in mice were true cancers, in every way similar to classical examples on the lip and tongue of man. An inevitable conclusion from the research was that the irritant did not produce cancer directly. It had been suggested that loss of nervous control predisposed to cancer, but Cramer showed that tarring took longer to produce cancer on a denervated skin area than on a normal area, and the time difference was practically that which the nerves required to grow again. It was usually more difficult to produce a second tar cancer than a first one.

In the observations falling into the third period the claim was made that the cancerous change was produced directly, without any intermediate preparatory phase. This period of work commenced 15 years ago with Peyton Rous's discovery of a sarcoma of the domestic fowl which could be transplanted to normal fowls by grafting. Extracts of this tumour when freed from cells by filtration through porcelain candles which retained visible microbes, gave rise to the identical tumour when injected into normal birds, and drying the material did not prevent the transference of the tumour. The fact that this tumour bred true, even when produced without living cells, and its behaviour, led to the view that its transmissibility was associated with the entrance into the body of an ultra-microscopic microbe. All attempts to cultivate the virus in artificial media failed, and the infective material soon lost its power to produce a tumour when incubated at the temperature of the body. Gye claimed, last year, that the loss of infectivity of the cell and bacteria-free filtrate on incubation were not due to death of the ultra-microscopic microbe, but to the destruction of an accessory chemical factor. The microbe was responsible for the proliferative characters, while the specificity depended on chemical changes in the cell which permitted infection. This, Dr. Murray said, was the first time a microbic hypothesis of cancer had been presented in a form which was compatible with the known facts of cancer structure and behaviour. He did not believe there were any other means than the experimental of solving the cancer problem.

EXTENSION OF ST. MARY'S HOSPITAL, PADDINGTON. A fund of £50,000 is being raised to provide two new operating theatres and 46 additional beds, of which 13 are to be reserved for cases of accident and sudden emergency. This is one of the conditions upon which King Edward's Fund has made a grant of £4000. Last year more than 1000 cases which, in the opinion of the medical officers, required urgent in-patient treatment had to be refused admission. The main operating theatre is described as "quite out of date" and lacking in essential equipment.

Reviews and Notices of Books.

A MANUAL OF THE PARASITIC PROTOZOA OF MAN. By CHARLES F. CRAIG, M.D., M.A. Hon., Lieut.-Colonel, Medical Corps, U.S. Army, D.S.M. London: J. B. Lippincott Company. 1926. Pp. 569. 35s.

THE rapid advances which have been made during recent years in our knowledge of the protozoan parasites of man and the diseases they cause have led to a realisation of the fact that it is essential for every medical practitioner, no matter whether he is domiciled in the tropics, in temperate or even in cold climates, to be able to diagnose with a fair degree of certainty each and every species inimical to human well-being. In our medical schools greater stress is being laid on the teaching of this subject, but in this both teachers and students have been sadly handicapped by the lack of up-to-date and reliable text-books. Since the war several excellent monographs have appeared, dealing, however, only with parts of the field, and also a few text-books; the former were more in the nature of zoological treatises, while the latter contained much that was irrelevant and did not emphasise the practical points so vital to the medical man.

To produce a work for medical students and practitioners, laboratory and research students, which would fill this want by adequately covering the salient features of the morphology, life-history, relation to disease, and prophylaxis of these parasites was the main object of the author in compiling his text-book. His manner of approach is an excellent one, and most methodical. After a general consideration of each group the individuals of that group are dealt with in detail. Thus a list of synonyms is given, subsequent history and nomenclature are discussed, and this is followed by a clear and lucid description of the morphological characters both as found in fresh and also in stained preparations. The life-cycle, method of reproduction, transmission, and mode of infection of the vertebrate host are all clearly set forth, while such points as the possibility of cultivating the organism in question or of producing infections experimentally in laboratory animals receive full mention. A section is devoted to the relationship which the parasite bears to the causation of symptoms of disease in man.

In startling contradistinction to the lucidity of the text is the way in which the illustrations have been prepared. The pictorial reproduction of the parasites is surely as important, if not considerably more so, than the written word. That the student should be able at a glance to compare his microscopical findings with an accurate drawing is, as must be obvious to all who have had either to learn or to teach the subject, one of the first essentials, and from this aspect the book falls sadly short of the necessary standard of excellence. A wide use has been made of photomicrographs, the majority of which are splendid examples of the photographer's art as applied to the microscope, but it must be remembered that the possibilities are limited in this direction, that only one focal plane containing, perhaps, a few of the main features can be registered, and even then the reproduction cannot be so sharp as the visual image. Thus, for example, in some of the photographs of the amœbæ the nuclei are moderately sharp and clear, while the cytoplasm or body substance, after all as important as the nuclear structure, is a meaningless shadow. The interpretation of a photomicrograph and its appreciation are matters for those already expert and not for students. With a few exceptions the illustrations, other than photomicrographs, have been taken from the works of other observers. Some of these reproductions do not appear to be as clear as the originals, while the combining of drawings from two or more sources has resulted in fusion products, which also do not appear to do justice to the original pictures. The value of a subsequent edition would be greatly enhanced by the inclusion of original drawings of microscopic appearances.

Where it has been necessary in the text to indicate that a certain matter is still sub judice, or that disagreement exists in the interpretation of certain phenomena, the author has endeavoured to state both sides of the question fairly and without bias. For example, he quotes the classifications of the amœbæ in man according to Dobell and Stiles and Boeck, is in complete agreement with neither, and finally gives a classification according to his own views. Indeed, it may be said that only in the case of *Craigia hominis*, not yet accepted as a true parasite of man by the majority of European, and more particularly British workers, does any suggestion of partisanship become evident, and, as this was described in the first instance by Craig himself, has been accepted by such authorities as Kofoid and Swezy, but has been rejected by others on what Craig considers to be inadequate evidence, his attitude on this question is only natural. Generally speaking, the author's teaching is in accord with the bulk of modern scientific opinion, and there are no large departures from the orthodox. We note, however, that he separates the parasite of æstivo-autumnal or malignant tertian malaria into two subspecies, *Plasmodium falciparum* and *P. falciparum quotidianum*. Again, in this section on malaria his use of certain expressions might conceivably give rise to confusion. The term spore should not be applied to the products of asexual multiplication—the merozoites—nor should gamete and gametocyte be used interchangeably. Sporulation, too, although used for many years now to indicate the final stages of the asexual cycle in man or schizogony, would be better applied to the formation of the sporozoites in the mosquito.

At the end of each chapter the author has given a list of references of the more important papers dealing with the subjects covered in that section. This list is not intended to be a complete bibliography; it contains more especially the recent work, and should be regarded by the student as an introduction to the literature. Another most useful feature is the technical appendix, in which is included the more important laboratory methods of cultivating or preparing permanent stained preparations of the parasitic protozoa.

We have no hesitation in recommending this book to the medical practitioner or the medical scientist as one of the best accounts of this important branch of medicine in English. One or two important additions might be made with advantage. The absence in the present volume of coloured plates showing the malarial parasites at all stages of development, and of the trypanosomes and allied flagellates, is noticeable. The number of original diagrams illustrating life-cycles should be increased and those already included should be carefully revised. There would seem little doubt that a demand for a second edition will give the author early opportunity to make these improvements.

NUTRITION.

Troubles des Échanges Nutritifs. By C. ACHARD, Professeur de Clinique Médicale à la Faculté de Médecine de Paris, Membre de l'Académie de Médecine. Paris: Masson et Cie. 1926. Two vols. Pp. 1220. Fr.110.

IN these handsome volumes Prof. Achard has adopted a new classification for the discussion of dietetics and all those diseases which chiefly affect nutrition. Physiology is his basis, and he considers in sequence all methods by which the body can ingest gases, water, mineral matter, carbohydrates, fats and lipoids, and lastly nitrogenous substances. "L'esprit gaulois," says one of Meredith's characters, "sparkles with the clear crystal of common sense," and in choosing this classification Prof. Achard has not only been able to display his facts in logical sequence, but has succeeded in approaching nearer

to a scientific classification than have the vast majority of his predecessors. In subsections, each in its appropriate place, he discusses the disturbances attendant on the faulty elimination of the metabolic end-products, and hence his work embraces nearly all the problems of disease amenable to dietetic treatment. It is clear that to be perfect his system requires an exact knowledge of the chemistry of all substances physiologically absorbed by the body, and that knowledge is not yet wholly ours. Thus the diseases known collectively as "deficiency diseases" are due to an absence of food constituents still largely mysterious, and in consequence the author has included very few words concerning scurvy or beri-beri and has not attempted any discussion of less tangible forms of avitaminosis. Similarly, the disturbances of health, such as chronic constipation, which are often the result merely of an ill-balanced diet, find no place in these volumes, as no upset of "nutritional exchange" can be noted in their case.

In a modest preface the author points out the impossibility of including the latest advances in a book of this size, but it is so fully documented with references to the work of foreign observers that we feel that such an apology was superfluous. His book will be highly appreciated by physicians in every country, and is worthy of the high traditions of French medicine.

THE DIABETIC LIFE: ITS CONTROL BY DIET AND INSULIN.

By R. D. LAWRENCE, M.A., M.D., Chemical Pathologist and Lecturer in Chemical Pathology, King's College Hospital. London: J. and A. Churchill. 1926. Pp. 167. 7*s.* 6*d.*

WITHIN a year of the publication of this useful manual a second edition has been called for. Dr. Lawrence points out that while no revolutionary discoveries have been made since the book was written, yet many new facts of practical importance have been established and have been incorporated in this edition. The chief changes consist in a rearrangement and further simplification of the line-ration scheme, and in the addition of some detailed examples of diet and a table for emergency use in coma. We have already expressed admiration of the way in which Dr. Lawrence has reduced this most complex and difficult subject to a level where doctor and patient can meet. There can be no better preparation for the tedious task of training a diabetic how to control his life than a study of this little book by his medical adviser, and no surer way of acquiring the patient's coöperation than the purchase by him of another copy for his own use.

JOURNALS.

INDIAN JOURNAL OF MEDICAL RESEARCH. April, 1926.—This journal contains some interesting papers. M. B. Soparkar, as the result of extensive experiments, concludes that Indian cattle as a whole are less susceptible to tuberculous infection than are European varieties.—J. W. Cornwall and W. A. Beer describe some peculiarities of *B. typhosus* in broth cultures. They also suggest a method of assessing the infectivity of rabies fixed virus, and, in a further paper, discuss the effect of injection of etherised normal brain substance in connexion with the treatment of this disease.—R. McCarrison gives an account of an eight months' investigation into the effect of excessive lime consumption upon the thyroid gland, and his conclusions on the connexion between lime and iodine ingestion have some bearing on the ætiology of "colloid goitre."—From the Haffkine Institute, B. P. B. Naidu, R. H. Malone, and C. R. Avari write on the potency of Haffkine's plague prophylactic. *A. pattoni*, a new species of anopheles found in Shantung, is described.—J. A. Sinton publishes some investigations on subtertian crescents, and finds that the number of crescent carriers after "quinine and alkali" treatment was less than after any other form of treatment tried.—H. E. Shortt, P. J. Barraud, and A. C. Craighead give methods for feeding and refeeding sandflies, and in another paper describe the life-history and morphology of *Herpetomonas donovani* in the sandfly, *P. argentipes*.—As the outcome of a commission appointed to investigate sandfly fever in the Peshawar District, T. C. McCombie Young, A. E. Richmond, and G. R. Brendish publish the account of an extensive survey and give important recommendations aimed at the reduction of the sandfly.

BRITISH JOURNAL OF CHILDREN'S DISEASES. Vol. XXIII. April–June.—Dr. Bernard Myers furnishes statistics concerning the height, weight, and other measurements of 1400 London school-children derived from his observations at the Children's Clinic, Cosway-street, Marylebone-road. Tables are given showing the measurements of the head, chest, abdomen, intercristal diameter, height and weight for both sexes; comparisons of the height, head and chest measurements for both sexes at various ages; and comparisons of these measurements with Greenwood's figures for other English children and Baldwin's statistics for American children. Myers remarks that invaluable information would be obtained if similar measurements of males and females could be made in all parts of the British Empire.—In a paper on varicella encephalitis and vaccinia encephalitis Dr. D. W. Winnicott and Dr. N. Gibbs have collected 12 cases of varicella encephalitis including one under their own observation. The patient was a girl aged 2 years, who nine days after the onset of varicella developed symptoms of encephalitis, such as difficulty in swallowing and articulation, squint, spasticity of the limbs, and mental dullness, which lasted for about a month, after which complete recovery took place. The fact that the number of days between the onset of varicella and the onset of nervous symptoms has been fairly constant in all the cases, but one is a record suggesting that there is more than a mere coincidence at work. Winnicott and Gibbs have also collected 44 cases of vaccinia encephalitis; 35 of these were reported by Bastiansee in Holland, and of the others one was a case of their own of a male child aged 5 months, who six days after vaccination developed right facial paralysis, left ptosis, left internal strabismus, and convulsions. Complete recovery took place within six weeks.—In a paper entitled Further Observations on Acrodynia, Dr. A. E. Vipond summarises the cardinal signs of the disease as follows: the onset appears to be a nasal catarrh, followed by a rash, which is often erythematous but may be papular or pustular. The hands and feet present a bluish-red appearance, as well as the tip of the nose, ears, and eyelids. The locomotor system is affected, the child being unable to walk. The sensory system is also involved, there being intense pain in the arms and legs. All the superficial glands are enlarged, especially those in the axilla and inguinal region. Rapid loss of weight occurs. The duration of the disease is from four to six months. Vipond has obtained good results from the use of a vaccine prepared from an enlarged gland.—Dr. C. I. Wright reports an unusual case of herpes recurrens. The patient was a girl aged 12, suffering from a moderate attack of diphtheria with an abundant eruption of herpes facialis on both cheeks, remarkable for the presence of several rounded tense unilocular bullæ, the largest of which was half an inch in diameter. For the last three years the child had had recurrent attacks of herpes on one or other cheek about three times a year, but in no previous attack had the lesions been bilateral. The mother, who was subject to labial herpes, stated that at the age of 4 years the child had had an attack of eczema which may really have been herpes.—The abstracts from current literature are devoted to acute infectious diseases.

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THE LANCET.

LONDON: SATURDAY, JULY 3, 1926.

TUBERCULOSIS AND EMPLOYMENT.

Every chronic disease has its own social and economic problems, and the unsolved problem of tuberculosis is employment. In the early stage of the disease rest for body and mind is the one great desideratum, but a time soon comes when employment is essential to preserve a healthy mind in an unsound body, and many years follow in which the sustenance for an unsound body can only be derived from remunerative employment. A Committee of the Joint Tuberculosis Council undertook some 18 months ago to make a survey of the whole question of the employment of the consumptive with special reference to schemes at present in existence. This Committee, which consisted of Dr. Jane Walker (London), Dr. D. P. Sutherland (Manchester), Dr. H. Vallow (Bradford), and Dr. J. B. McDougall (Hexham), has now circulated what is in the main an agreed report dealing with all aspects of the problem—medical, social, and economic.

Except in the rarest instances the worker who has broken down from tuberculosis can never safely compete again in the industrial machine. Even with quiescent disease his work is apt to remain 30 or even 50 per cent. less efficient than that of a healthy workman similarly trained, and the Committee was unanimous in its belief that the total number of ex-sanatorium patients who may be ultimately employed on a remunerative financial basis can only form a small fraction of those who are fit for some employment. Finance hitherto has dominated the situation, and even the modest recommendations of the Barlow Committee to provide ten village settlements of 200 to 250 families each at a cost of a million pounds has not been realised. In the Committee's opinion the best method of attacking the problem is to develop occupational therapy at existing sanatoria, to make so-called training an integral part of treatment until by coöperation and efficiency it becomes possible to pay maintenance and wages for one permanent settler, then for another, and so on until a nucleus of a settlement has been formed. It is in this way that successful schemes have arisen, and the Committee is able to point to examples of institutions founded de novo as training colonies and settlements with ample capital outlay where the return has been disappointing. It is a necessary preliminary to ascertain what is the economic unit for any sanatorium industry. The question of markets is a business affair, and investigation into the London leather-workers' scheme for ex-patients suggests that if it could be increased so as to employ 50 men the scheme would be self-supporting and the present overhead charges fully met. At some stage capital expenditure becomes inevitable unless a scheme is to be crippled by inability to extend departments of work which have been set running on sound lines; and in order to provide capital for such development the Committee recommends that sums of money from £200 to £500 should be made available after a definite scheme submitted by the medical director has been approved by the lay management responsible. Whether this money should be subscribed by voluntary contribution to a central fund or by a levy on the local authority is open to discussion, but in either case it is clear that the local authority should take its share in housing employees when that need arises. The difficulty is that in any such scheme there is singularly little margin for mistakes. No fewer than 51 different occupations have been suggested as suitable for ex-patients, and the Committee recalls a remark made by the director of the New York Tuberculosis Association, already quoted in our columns, that "teaching Chinese to a negro, infusing a Latin-American with a puritanical outlook on life, or inducing statesmanship in a politician are problems equal in toughness to finding a suitable job for a tuberculous person and keeping that person in that job."

Farm work is certainly too arduous for ex-sanatorium patients, although the raising of poultry, fruit-farming, and bee-keeping are all admissible, as well as the supervision of the production of the laboratory animals. Any workshop occupation chosen should be one which does not require a long period of preliminary training and which is principally repetition work resulting in mass production of an article for which there is a current demand. It is better, the Committee thinks, to specialise in a few than to have mediocre results from many employments, and for the nucleus of any department there is always needed a specialist with previous training who becomes the key-man to its output. Nor is the supply of suitable directors for such schemes likely to be abundant, for the director has to combine medical oversight with a good general knowledge of industry; no matter what facilities there may be in the way of markets or workshops or even capital, any scheme is doomed to failure without good business organisation, capable direction, and proper coöperation. But when all the requisites are present there is no limit to the possible success of such a scheme, which may grow from a small beginning to a big social movement, and the Committee no doubt is right in recommending that schemes which have been admittedly successful should be encouraged to develop further by being freed from the obligation to raise capital by their own efforts. Such schemes should then be copied in principle in other places.

CHOLECYSTOGRAPHY.

One of the finest examples of fruitful results proceeding from academic medical research is the evolution of tests for the function of the kidneys and liver, which was led up to by the investigation of the pharmacology of phenolphthalein compounds. Phenolphthalein occupies a curious place in physiology, for one of its compounds, the sulphone derivative, is excreted almost solely by the kidneys, whilst the halogen compounds are excreted partly by the kidney, but to a greater extent by the liver. The phenolsulphonephthalein test for renal function has been established for a number of years. When it was discovered that the chlorphenolphthalein compound was excreted very largely by the liver, an analogous test measuring the amount of the substance in the blood stream and its rate of elimination was devised for estimating the functional power of the liver cells. It having been established that the drug was excreted mainly by the liver, and the work of Rous and McMaster having demonstrated that bile is concentrated in the gall-bladder, and it having been observed that the bromo- and iodo-compounds were opaque to X rays, it occurred to E. A. Graham that it might be possible to obtain a shadow of the gall-

bladder after preliminary administration of one of these drugs. This proved to be the case, and the procedure has been developed so that it can be applied in human pathology and has received the name of cholecystography. Considering the fact that GRAHAM'S preliminary report was only published in 1924, a very considerable amount of knowledge has been collected on the subject, and the method, although not yet standardised, has become definitely established in clinical medicine. Mr. STANFORD CADE in his Arris and Gale lecture, appearing elsewhere in this issue, has reviewed the known facts, communicated some experiments bearing on the subject, and given his experience of the method used in 100 patients. Dr. IZOD BENNETT, Dr. A. MONCRIEFF, and Dr. F. G. NICHOLAS also record this week their clinical experience in 58 cases.

There are two methods of carrying out the test, one is to give the drug intravenously and the other by mouth. Mr. CADE is convinced that the intravenous method is the better and regards oral administration as unreliable, whilst the other investigators, agreeing with some reports that have come from America, consider mouth administration preferable. The objections to intravenous injection are two. One is the fact that if the slightest drop of the solution escapes outside the blood-vessel into the subcutaneous tissue, extensive sloughing and inflammation occur; the other is that intravenous injection is not always without an element of danger. Even Mr. CADE reports two serious cases of collapse in his series and the experience of other people agrees with this, whereas after oral administration the worst that happens is that the patient may suffer from vomiting and diarrhœa. One of the essentials for the general application of a diagnostic method is that it should be without danger. There is no doubt that the intravenous method gives better shadows and is on the whole more reliable than the oral administration, so there is every incentive to make the former method as safe as the latter. It is hoped that investigations will continue in this direction. The difficulties met with after giving the drug by mouth are due to the fact that it must be protected from contact with the hydrochloric acid in the stomach, for by the action of gastric juice the chlorphenolphthalein compound is produced, a substance which is not only insoluble, but does not give a shadow with X rays. It is not easy to make a capsule which will certainly escape gastric digestion and yet be disintegrated within the intestine. Whether such solution of the capsule has taken place, however, can be seen when the subsequent skiagrams are inspected. The dose which can be administered by mouth is no greater than that by the veins, for if it is increased, vomiting is produced and the test is spoilt. If after taking the drug by either route a good shadow of the gall-bladder is obtained, it may be confidently inferred that the gall-bladder is healthy. If no shadow is seen after intravenous injection, or after oral administration, provided there is reasonable certainty that the drug has been absorbed, then the conclusion must be drawn that the wall of the gall-bladder is diseased, that it has lost its powers of concentration, or that the cystic duct is blocked so that none of the drug arrived in this viscus. Not only does the clinician take note of the presence of a shadow, he also observes the rate of diminution in size of the opaque area, which is dependent upon gall-bladder contractions.

To test the contractile power of the gall-bladder L. R. WHITTAKER [1] advises that when a good shadow with X rays is observed, food rich in cream and butter should be given to the patient. The shadow should then disappear within 2-3 hours, instead of continuing for 24. Fats have been proved to be the most powerful stimulus to contraction of the gall-bladder. Magnesium sulphate introduced into the duodenum by an Einhorn tube will also cause the shadow to shrink, but not so quickly and not to so great a degree. Gall-stones are rendered evident after the test sometimes by giving a mottled appearance to the shadow (they are transparent to the X rays and each stone causes a hiatus in the opacity), sometimes by absorbing the dye in sufficient amount to become opaque themselves. The animal experiments reported by Mr. CADE support the investigations of other observers, showing that none of the dye reaches the gall-bladder by the blood stream, nor is it absorbed from the wall of the gall-bladder. That is, disappearance of the shadow is due to propulsion of the dye from the gall-bladder down the cystic duct. There appear to be but few fallacies when the test is properly carried out. Even allowing for enthusiasm for a new and ingenious procedure, the results of cholecystography reported from all quarters show such a degree of reliability that the method is certain to obtain a permanent place in diagnosis.

[1] Jour. Amer. Med. Assoc., 1926, lxxxvi., 230.

THE PRACTICE OF PREVENTIVE MEDICINE.[1]

ABOUT seven years ago when public affairs in every direction were attempting to shape themselves towards the many new conditions imposed upon all society by the war, a memorandum was addressed to the Minister of Health by Sir GEORGE NEWMAN entitled "An Outline of the Practice of Preventive Medicine" which formed a valuable piece of topical history. The outline was large in scope and elaborate in detail despite its title, and as it was published at a very modest price there is no doubt that many of our readers read and digested its lessons. It is certain that the great public who take an administrative as well as a theoretical interest in the progress of national health did so, for this week a new edition of the memorandum appears in response to the fact that the first edition has been out of print for some time. The form of the document has remained unchanged but a considerable amount of new matter has been added to the text, while the whole of it has been revised.

Taking as a general thesis that the purpose of the science and art of preventive medicine is to apply human knowledge to the prevention of disease, the author, after a brief disquisition on the modern developments of medicine, especially in practical application, analyses the nature of disease, showing that the body must be judged by its heredity, nurture, potentialities for nutrition, and its habits when estimating its resistance to injury—or infection, resistance to infection introducing the principles of epidemiology. These are laid down in a few clear lines, in which the secular trend, the epidemic constitution cycle, the seasonal cycle, the climatic and immunisation factors, and the biological change of state of the virus are considered, indicating the all-round nature of the document and the determination of its author to explain what he intends to teach. In face of the actual problems we have indicated the various avenues of approach to their comprehension. The main directions in which the practice of preventive medicine has to be conducted for the public good are illustrated by the results generally of the Public

[1] An Outline of the Practice of Preventive Medicine. A Memorandum by Sir George Newman, K.C.B., M.D., F.R.C.P., Chief Medical Officer of the Ministry of Health. London. His Majesty's Stationery Office. 1926. 1s.

Health Service, by those of the School Medical Service, by those of the National Health Insurance system, and by the activities of the hospitals; and, taking the whole record as it at present stands, certain broad deductions can be drawn from the facts and figures in regard to the physical condition of the English people—we can learn what has been done and judge how much remains for accomplishment. Thus a steadily falling birth-rate is accompanied by a steady decline in death-rate at all ages, but with an increased expectation of life from birth upwards. The infant mortality rate, though it now stands at 75 per 1000 births (one of the lowest ever recorded) is still unnecessarily high, but the burden of epidemic and infectious disease is growing lighter and with certain exceptions the figures show steady decrease both in incidence and mortality. The victory of preventive medicine over certain infectious diseases has been accompanied in recent years with general improvement in sanitary environment, but both these facts call for qualification. Tuberculosis, cancer, measles, and influenza are still unduly prevalent; rheumatic conditions affect a large section of the population; venereal disease, though recent activities have certainly been satisfactory in promise and performance, accounts for much sickness and mortality; while it is an open shame that the supply of houses is insufficient and frequently of discreditable quality, a position which hampers preventive medicine to an untold extent. There is also far too much minor invalidity and, though the general death-rate has fallen, an undue proportion of deaths still takes place under 50 years of age. Preventable morbidity and invalidity of all kinds call for the wide but intensive application of the activities of preventive medicine. That is in effect the message of the Memorandum.

The document is written, as might be expected, with skill in marshalling facts and in drawing succinct conclusions from them, this being done with due regard for the risks of being over positive. It is sure to be widely read, as it was in its original form, by the public as well as the medical profession, and knowledge of the facts contained would form a practical adjunct to medical education. Medical students in the later phases of the curriculum should be urged to read it, for it lays before them clearly and simply the fundamental principles of their future work—namely, to prevent disease.

Annotations.

"Ne quid nimis."

THE PATHOLOGICAL ACTION OF LIGHT.

Finsen, in a small but classic work, describes in a delightful way the response of the living to light, how birds break into song, and children into laughter with the coming of the sun. Beneficent in its action in the vast majority of cases when living things are exposed to light, some pathological conditions do supervene, and these may occur either in normal people if they are given too much light or in hypersensitive individuals if they are exposed to light of an intensity enjoyed by the majority. Where cause and effect are related so obviously as exposure and physiological response to sunlight, it is remarkable how little is known of the mechanism of this action. Could the phrases of Finsen be written in stricter physiological terms, an understanding of the pathological states induced by light would perhaps be assured. As it is, information gleaned from clinician, physiologist, and pathologist is grist for the mill. It is doubtful whether any organ of the body could illustrate so well as the eye the different varieties of disturbances in living structures caused by light, and the recent communications of Dr. W. S. Duke-Elder in our columns will serve not only to bring within moderate scope a host of scattered facts but also to show the complexity of the processes in front of those who essay the rôle of phototherapist. While in some cases the action of the rays is attributable to an exaggerated physiological response, capable of correction by the rebalancing forces of the body, in others the upset of equilibrium in carried beyond this stage and physico-chemical changes of an irreversible character, such as coagulation or precipitation, occur. There appear to be two main lines of defence, apart from clothing, by which the surface of the body is protected from excessive light. One is pigmentation which absorbs ultra-violet and visible light to an extraordinary degree, converting this energy into heat; the other is fluorescence, which transforms rays of short wave-length into longer ones (never shorter), in many cases thus protecting the tissues from rays which have such powerful effects upon them. Except for these processes, the body has to deal as best it may with light beating upon it. The discoveries on the action of light in countering certain diseases have opened enormous fields of research, and the fact that light can endow certain foods with new and valuable properties will not be lost upon those who are seeking to explain its biological actions, for it is possible that foodstuffs within the tissues are to some extent altered by exposing the body to light. Medicine now takes stock of radiation of widely differing wave-lengths, for heat, light, ultra-violet, X rays, and the gamma rays serve its various needs. The pathological conditions which they have initiated in man are incomparably fewer than those they have alleviated, but the need for more investigation of the processes set going in living things by these rays is a pressing one.

THE ACTION OF HISTAMINE.

THE vaso-dilator action of histamine and its physiological significance is discussed by J. H. Burn and H. H. Dale in the April number of the *Journal of Physiology* (vol. lxi., No. 2). The observations recorded were undertaken to complete those of Dale and Richards made in 1918. What may be called the histamine paradox has been the subject of much discussion. In the cat, which has been the usual subject for experiment on its action, histamine regularly produces, under anæsthesia, a powerful depressor effect having all the characteristics of a general vaso-dilatation; in perfused organs from the same species histamine has been found habitually to produce not vaso-dilatation, but vaso-constriction in its place. Explanations of widely different kinds have been offered for this paradox. It was found that the vessels of a cat's limb artificially perfused with blood are relaxed by histamine. The tone favouring this reaction is evanescent, but can regularly be restored by a trace of adrenalin, and occasionally by pituitary extract. The vessels of the limb of a monkey or dog, artificially perfused, are relaxed by histamine, and the reaction can be obtained repeatedly. The perfused arterioles of the cat are constricted, those of the dog relaxed by histamine. It is suggested that the predominant incidence of the histamine dilator action on the capillaries is peculiar to the cat. There is evidence that a secondary pressor effect of histamine is due to accelerated output of adrenalin; and that the depressor effect of small doses of adrenalin seen in the anæsthetised cat or dog is also a secondary effect, due to liberation of a histamine-like principle. The bearing of these observations on the chemical control of capillary tone is discussed. To the same issue of the journal O. Inchley contributes some observations on histamine shock. It is generally accepted that histamine is a direct poison to capillaries, leading to their dilatation. This dilatation is associated with a fall of blood pressure and a state of collapse. Capillary dilatation is the characteristic phenomenon of histamine shock as well as of shock by other substances. Dale's view, which is generally accepted, is that histamine acts directly on the capillaries. The author suggests another and simpler explanation to account for the effect—namely, that the dilatation of capillaries is passive and due to a constriction of the veins.

In a circulation through intact arteries, capillaries, and veins, where a variable resistance may be imposed in any one of the three, it is difficult to draw conclusions as to which is affected in altered circulatory conditions. Experiments were devised to examine each of these factors separately. On isolated organs of cats and rabbits—e.g., intestine, liver, muscle of a limb—experiments were made with perfusion of arteries and capillaries without veins, and perfusion of veins and capillaries without arteries. In an excised loop of small intestine of the cat perfusion with oxygenated Ringer with the addition of histamine phosphate was made through arteries or veins without capillaries. Ring preparations of the mesenteric artery and vein of the pig were studied when immersed in Ringer's fluid, to which different concentrations of histamine were added and the effects recorded. The results suggested that vascular constriction under histamine is mainly venous. Experimental occlusion of veins—inferior vena cava above the entrance of the renal veins, and the portal vein—was made in anæsthetised animals. Large veins were painted with a strong solution of histamine in an anæsthetised animal and the effects—local and general—studied; and lastly, the effects of intravenous injection of large doses of histamine were examined. The author discusses his results, and concludes that histamine in low concentrations constricts the veins, leaving the arteries unaffected, such constriction leading to passive dilatation of capillaries. Long-continued occlusion of great veins leads to permanent relaxation of capillaries. The author concludes that histamine shock is best explained by venous constriction.

THE ÆTIOLOGY OF ECZEMA.

THE perplexing problem of the ætiology of eczema is discussed by Dr. F. F. Coombes in an authoritative essay forming part of a symposium on dermatology recently published in America.[1] He stresses the fact that during the last 50 years the frequency of this diagnosis has been reduced from about 60 to 20 per cent. of all cases of skin disease, and explains the reduction as due to (1) the recognition, both microscopic and cultural, of a large class of bacterial and mycotic parasitic infections; and (2) the elimination from the scrap-heap of eczema of those cases of dermatitis which are dependent on an external cause of irritation and do not proceed to the formation of vesicles. As examples of the first class are instanced seborrhœic dermatitis, infectious eczematoid dermatitis, due to the *Staphylococcus aureus* and *albus*, and cured by the local application of mild antiseptic remedies, and a very large and increasing group in which a member of the ringworm family is the demonstrable cause. In the second class are placed a heterogeneous variety of dermatoses which include neurodermatitis and the huge class of trade eczemas. The effects of scabies, pediculosis, hair-dyes, and other external irritants are also in this category. The author, in common with most members of the modern school, is driven to the conviction that external irritation alone is not a sufficient cause for eczema, for otherwise all persons working in a noxious atmosphere would be equally liable. Some idiosyncrasy, with the subsequent development of local sensitivity, has to be assumed for all the cases of eczema which arise after any kind of external irritant has been applied, or without such an obvious and immediate cause—i.e., de novo. Dr. Coombes quotes an interesting experiment by H. Jaeger. 140 patients with normal skins, and 77 with eczematous lesions of various types, were all submitted to the same routine tests with external irritants. Only 4 per cent. of the normal persons showed any reaction, while 55 per cent. of the eczematous developed new lesions on the irritated area indistinguishable from acute vesicular eczema. Jaeger concluded that this susceptibility was due to a tissue idiosyncrasy and not to a humoral defect or internal dysfunction. The attractive though rather fanciful theory of Ehrman, that eczema can be caused through the invasion of the circulation by way of the gastro-intestinal tract of relatively large protein molecules, which irritate the skin papillæ and cause exudation, has a certain number of supporters. Such a mechanism is more likely in urticaria. Hypoacidity (Uhrbach) of the gastric secretion may be a factor in some cases, but there are many with which hyperacidity is associated. The correction of the gastric disorder only rarely results in a cure of the eczema. That eczema is due to some disturbance of the metabolic ratio—i.e., an excessive intake of carbohydrates, fats, or protein—is a theory which is at present popular, particularly as regards the eczema of infants. Against this it is observed that while skin affections of more than one kind may occur in diabetics, there are many patients with a high blood-sugar who have no cutaneous lesions. The same can be said of those with excessive uric acid content of the blood. This is just as likely to be a result as a cause of eczema. It is possible, however, that variations in the chemistry of the blood may have a sensitising effect on the skin and so favour the development of the disease.

The theory of food allergy appears to attract Dr. Coombes more than any other. He instances egg protein as a cause in infants particularly. Wheat can act in the same way, and there may be a combination of two or more proteins noxious to one individual. In the majority of food-allergy eczemas, asthma is associated or may alternate with the eruption. Cutaneous tests are not always successful in determining the actual protein and the manner in which they act is undetermined. One theory is that the vagotonic nerves are irritated, "producing areas of capillary dilatation with pruritus," which react to scratching by the production of vesicles (eczema). But most of such protein cases are dry and papular, and do not vesiculate; many of them are classed as neurodermatitis, and therefore do not really fall into the same category. The part played by food protein in the causation of eczema has naturally led to the assumption that bacterial proteins may act in the same way. The author states that he has never seen a positive reaction to a bacterial protein which, given later as a vaccine, brought about a cure of the eczema. The influence of the endocrine glands is considered in a short paragraph, and dismissed with the observation that they constitute only one factor in maintaining a balance of nerve control (equilibrium of the vagotonic and sympatheticotonic nervous systems), and can therefore be regarded only as a contributory cause of the disease.

[1] Medical Journal and Record of New York, March 17th, 1926.

THE MODERN GERMAN VIEW OF BAYER "205."

Dr. W. Roehl, one of Ehrlich's early co-workers in chemotherapy, recently reported[1] to the German Tropical Medical Fellowship at its Hamburg Congress, on the action of Bayer "205," now known in Germany as "germanin." Dr. Roehl's work has been done in the chemotherapeutical laboratory of the Elberfeld Dye Factory. Bayer "205" belongs, he says, to the large group of complicated urea-substitution products of the aromatic group, having in its molecule no metals or metalloids exerting chemotherapeutic action, no mercury, bismuth, arsenic, nor antimony. Its molecular constitution was published [2] in 1919. How, asks Dr. Roehl, does such a substance act on blood parasites? It has none of Ehrlich's toxophore groups, nor such haptophores like OH or NH_2, and yet everyone is in agreement that it does not act primarily on the patient, encouraging antibody formation, but directly on the parasites, for very slight changes made in the molecule at once varied the effects on the different individual parasites. Dr. Roehl answers his own question in the following

[1] Arch. für Schiffs- u. Tropen-Hygiene, 1926, xxx., Beiheft 1, p. 103.
[2] See Annual Report of the Medical Research Council for 1921.

way. Sulphosalicylic acid precipitates albumin. In these ureas there are sulpho-acid groups which act on the albumins of the parasites (perhaps on the protamine), forming salts that are only slightly soluble. Thus the chromatin from the milt of herrings is a neutral salt, clupein nucleinate, and the clupein base combines with acid dyes to form salts insoluble in water. In the same way, the bases in the cell contents of the parasites (trypanosomes and the like) combine with the sulpho-groups of Bayer "205" to form barely soluble salts, the parasitic chromatin being therewith hampered, as if filled up with bird-lime or with glue, made physiologically less active, and the cell is to some extent thus withdrawn from metabolism. Many substances have been examined, and those that gave the best antiparasitic results had only the sulpho-groups in common, so it was this group that was thought to be the effective part. Ureas with either benzol or naphthalin groups may be effective, but they must have large molecules if their action is to be lasting, and they must have a certain number of sulpho-groups, able to combine with basic substances in the cells of the parasites to form salts only slightly soluble in water. Little is known of the bases that exist in albumins. The chemist cannot say in advance whether the salts will be soluble or no, only actual experiment can decide that. The acid part of the substituted urea combines with the basic part of the chromatin of the parasite, metabolism is slowed, cell division is hindered, and reproduction is delayed or ended for the time. In this series of antitrypanosome drugs, although there is no toxophore group, like the poison on the arrow, kept applied by the haptophore barb, yet the haptophore sulpho-group attaches itself to the chromatin, and so lowers the vitality of the parasite that it dies tired out, like a whale worn out in dragging the ship after him by the rope, though the harpoon was not poisoned. The subsequent distribution of the drug in the host or patient is important. It may circulate in the serum and be thence taken up by the parasite at once, and at times this action takes place very quickly; in 15 or 30 minutes the parasites may be so much altered that, though their number is unchanged, the blood is no longer infectious. If the drug remains in the serum, it is probably effective for a shorter time than if it is absorbed and stored by the cells of the body—on the analogy of Congo red which is at once taken up from the blood by waxy or amyloid substance, so that none remains in the serum after a very short time. Variation in storage explains why the effective dose against the same parasite differs in different animals. If the drug is stored, it is gradually released and eliminated, whereby the parasite has a prolonged exposure to the drug, though at a lower concentration. When the drug has been nearly eliminated, its "pressure" falls too low, and the parasite, if not already destroyed, begins again to increase, and the patient suffers a relapse, unless given a new dose. Hence the reason for a course of injections. The weakened parasite may succumb to the protective chemistry of the host (i.e., the antibodies formed), but if the host has no protective power and cannot form antibodies, antimony may be given. Races of parasites may be grown immune to particular ureas but still susceptible to others, perhaps even to others closely allied. The constitution of the parasite has been so changed that it has learned slightly to alter the bases in its albumins so they shall not form any but soluble salts with the acids in the drug. Picric acid has a very similar action, but nitrates are less useful than sulpho-salts, for the molecule of soluble nitrates is too simple, while the nitrates of sufficient molecular weight are too insoluble to be available for injection. On the other hand, the soda salts of the sulpho-acids are easy to work with. Dr. Roehl concluded his review of the action of "germanin" with an expression of gratitude to the chemists who, led by Dr. Heymann, had worked with him. Only by effective combination of chemist and chemotherapeutist, he said, can results be won.

SLEEPING SICKNESS IN TANGANYIKA TERRITORY.

AN epidemiological survey of human trypanosomiasis is at present being undertaken by an international League of Nations Commission in Central Africa. Prof. F. K. Kleine is engaged in Tanganyika Territory on this work. The extreme variations in pathogenicity of the human trypanosomes, as well as the diversity in the clinical aspects of the disease in widely separated districts, are among the complex problems being studied. The outbreak in Mwanza on the south-eastern shore of Lake Victoria in 1922 was originally investigated by H. L. Duke [1] and C. F. M. Swynnerton.[2] Several interesting and novel facts were elicited during the course of this epidemic which proved to be one of exceptional severity. It was found, contrary to expectations, that the trypanosome belonged to the *rhodesiense* type and was transmitted in a direct manner from one infected individual to another by a new species of tsetse-fly which became known as *Glossina swynnertoni*. It could not be definitely ascertained whether or not the particular outbreak was attributable to the fact that in the absence of big game, which had entirely deserted the district, the tsetse, deprived of this service of food-supply, had been entirely dependent on human blood. The novel views of Duke and Swynnerton have been opposed by J. B. Davey [3] from his own personal experiences in this territory. A recent report to the Secretary of State for the Colonies concerning sleeping sickness in Tanganyika Territory would seem to indicate that the *rhodesiense* infection is more widely spread than had been supposed. Prior to 1914 this infection had not been recorded further north than the shores of Lake Nyasa. Now we understand that Rhodesian sleeping sickness exists in (*a*) the Mwanza area, where the original outbreak was discovered in 1922; (*b*) near Ikoma, situated about 50 miles north-east of the area mentioned above (there is considerable inter-communication between the natives of these two areas and it is possible that at least some of the cases detected in the Ikoma district were infected in the Mwanza); (*c*) in the Liwale sub-district of Kilwa—this appears to be a localised outbreak of low virulence; (*d*) in the southern portion of the Tabora district and northern part of Ufipa. This is the most extensive area found to be infected, more than 10,000 square miles of country being involved. Approximately 300 cases have been reported with 90 deaths. The type of disease is similar to that described in Nyasaland and by Kinghorn in Northern Rhodesia, cases being found in villages widely separated, and as a general rule only a very small portion of the inhabitants are infected. Rarely the disease becomes epidemic in a localised community, and when this is so it appears probable that some concomitant cause is present, such as marked shortage of food. This not only results in lowered vitality but also in increased contact with the fly due to more frequent visits to the forest for the purpose of hunting and in search of food. The methods adopted to prevent the spread of the disease have, in the main, been confined to the treatment of infected cases and the concentration of the population in fly-free clearings. Treatment has been principally by "Bayer 205" and by tryparsamide. The former has proved very effective in early cases when given in adequate dosage, while tryparsamide gives better results in cases in which the nervous system is involved. Cases of sleeping sickness due to infection by *Glossina palpalis* continue to occur in the neighbourhood of Kigoma, 14 cases being reported

[1] Duke, H. L.: An Inquiry into an Outbreak of Human Trypanosomiasis in a *Glossina morsitans* Belt to the East of Mwanza, Tanganyika Territory. Proc. Roy. Soc., Jan. 4th, 1923, Ser. B, xciv., 250–265.

[2] Swynnerton, C. F. M.: The Entomological Aspects of an Outbreak of Sleeping Sickness near Mwanza, Tanganyika Territory. Bull. Ent. Res., January, 1923, xiii., Pt. 3, 317–370.

[3] Davey, J. B.: Trans. Roy. Soc. Trop. Med. and Hyg., Nov. 19th and Dec. 17th, 1925, xix., Nos. 5 and 6, 336–338.

during the year. A medical officer is now stationed at Kasanga at the southern end of the lake and it will be possible in the future to make a more detailed examination of the inhabitants of the lake shore. While there seems little danger of a widespread epidemic of sleeping sickness occurring in the territory, there is no doubt that the large areas infested with *G. morsitans* are a constant menace. The problem is a large one, and sanction has been obtained to create a distinct branch of the medical department to deal exclusively with trypanosomiasis. This will be under the control of a medical officer with considerable experience of sleeping sickness and will be staffed by officers who show special aptitude for this work.

THE DIRECTOR-GENERAL, A.M.S.

Major-General Sir Matthew H. G. Fell, K.C.B., C.M.G., has been appointed Director-General, Army Medical Services, in succession to Sir William Leishman. Major-General Fell served in France and Mesopotamia during the war with great distinction and success, and was eight times mentioned in despatches. In 1918 he was lent to the Air Ministry and acted as Director, Medical Services, R.A.F., till 1921. Subsequently he became Inspector, Medical Services of the Army (1921–22), and Deputy Director, Medical Services (1922–26), serving in Turkey, in the Northern Command, and in Egypt. He returned from Egypt to take up the appointment of Deputy Director-General, Army Medical Services, on June 1st, the day before Sir William Leishman died. He enters on his responsible duties at the moment of great reforms.

SPIRITUALISM.[1]

A CONSECUTIVE history of modern spiritualism on general lines was required, and Sir Arthur Conan Doyle tells the story "with such obvious sincerity," investing it "with such vibrant interest, that its appeal is by no means confined to professing spiritualists." The quotation is from the publishers' statement on the cover, and we are happy to take it over. The work has grown from small disconnected chapters into a narrative, we learn, and it appears to deal in a way with the whole spiritualist movement, its serious approach being accentuated by a statement in the preface that this movement "is regarded by many as the most important in the history of the world since the Christ episode." In the first volume we have the story of, among others, Swedenborg, Edward Irving and the Shakers, Andrew Jackson Davis, Home, the Davenport and Eddy brothers, while there is the fullest account of the association with the phenomena of spiritualism entered upon by Sir William Crookes. The well-known story of mysterious rappings at Hydesville is also told, and their inexplicable nature is dwelt upon in an appendix as a communication from Horace Greeley, the great publicist, who founded the *New York Times*. In the second volume we have the story of Eusapia Palladino, an illiterate Neapolitan, whose manifestations were decided by the Society for Psychical Research to be fraudulent, and it is certainly a proof of the perfect honesty with which Sir Arthur Conan Doyle deals with the subject that he should have told the record of this lady in such detail; her adventures in spiritualism are usually quoted as an argument for the credulity of spiritualists. A chapter concerned with the activities of the Society for Psychical Research is interesting, for it is known that the outcome of the work of the Society is confusing. Sir Arthur Conan Doyle finds the record of the Society to be a strongly blended one of usefulness and obstruction, furnishing us with reasons for the belief that its investigations have been conducted without bias. In other sections of this volume we come across the well-known Mrs. Piper, the material manifestations of "ectoplasm," the results of "spirit photography," and the poignant association of spiritualism with the war. The volume closes with sections upon the religious aspect of spiritualism and the after-life as seen by spiritualists. These and many other aspects of spiritualism do not enter into the province of medicine, and we must here regard the work as one written by a medical man and sent for review to a medical journal. Inside this reference it is right to recommend our readers to ascertain for themselves from Sir Arthur Conan Doyle's pages what a devoted worker along spiritualistic lines, who has the advantages given by a scientific training, can say for a movement which, while it has none of the awful significance alluded to in the preface, is stirring deeply the imaginations and possibly influencing the lives of a large section of the public. The volume is well illustrated, largely with portraits of prominent supporters of spiritualistic theories and work.

[1] The History of Spiritualism. By Arthur Conan Doyle, M.D., LL.D. In two volumes. London, Toronto, and New York: Cassell and Co. 1926. Vol. I., pp. 342; Vol. II., pp. 342. 42s.

THE CARE OF CRIPPLES.

THE Central Committee for the Care of Cripples seeks to fulfil very similar functions to those which the Charity Organisation Society exercises in a more general sphere. The investigation of the causes of crippling and their elimination, and the coördination of all the agencies which seek to provide treatment and training are among the objects which it pursues. The second biennial report for the years 1924 and 1925 is able to record very great progress since the publication of the first. Comprehensive schemes, generally on a county basis, have been adopted in many parts of the country and the blanks on the orthopædic map of England seem in a fair way to be filled up, but a great deal of constructive work is still to be done. The foreword of the report concludes by pointing out that the test of a successful scheme will be when those who work it see that they can get help in their task from all sources. Besides the treatment of physical disability, the training and employment of the cured cripple offers a problem for solution. In London such education is more or less provided for, but elsewhere it is extremely difficult to find means of technical training for a cripple over school age. Even after the cripple has received his training he may be handicapped by some residual disability and be unable to compete on an equality with his normal work-mates. A scheme intended to deal with this problem was started in Oxfordshire, and as a result the Ministry of Labour has approved the establishment of a special committee in each area, on which juvenile employment exchanges, employers, and trade-unions should be represented, as well as members of the staffs of hospitals and clinics who know the capacity and limitations of the cripple. Such committees are already at work in the Oxfordshire area and in Hertfordshire. In the April number of the *Cripples' Journal* will be found the concluding portion of a brief autobiography of a cripple, a moving but true story which shows the terrible trials which some cripples have to undergo. The particular case was no doubt an exceptionally severe one and not typical of the great majority of cured cripples, but it nevertheless brings home to the reader a sense of the difficulties inherent in the search for remunerative employment for cripples. This number of the journal contains much that is interesting concerning surgical tuberculosis, occupational therapy, and other subjects. It has for the last two years been published quarterly at Oswestry, but henceforth its office will be in London, and with the July number it becomes the property of the Central Committee for the Care of Cripples. We wish it success in its new circumstances. A systematic and widespread organisation for the care of cripples needs money, and this is a peculiarly bad time to get it from an impoverished country and an overburdened Treasury, but it has been shown that the crippled child, if properly treated and looked after, is in most cases fit to attend an ordinary school, and thus the expenditure upon the

costly "physically defective" schools will be very greatly reduced. Among the schemes which are described in this report that dealing with Bath, Wilts, and Somerset is noteworthy. To serve as the central hospital for this, an entirely new hospital was built near Bath, remarkable for its low cost considering the durable nature of its construction, which is due largely to the simplicity of its design and materials. Excellent work has been done here and at the clinics in all kinds of orthopædic cases and especially in the treatment and correction of faulty posture. In Birmingham an amalgamation of the Royal Orthopædic and Spinal Hospital and the Birmingham Cripples' Union has made an efficient organisation of the care of cripples possible. The area for which it will take responsibility is a very populous one, including besides the city the huge industrial area known as the Black Country. In this report due credit is given to the Invalid Children's Aid Association, which has done and is doing so much good work on the care of cripples after their discharge from hospital and while they are attending as out-patients. Similar good work is done by the Central Council for Infant and Child Welfare at other places, and the relations between these societies and the Central Committee for the Care of Cripples are close and cordial and likely to become even closer, thus ensuring coördination and avoiding overlapping of activities.

VENTILATION IN FACTORIES.

VENTILATION up to recent years has been a Shibboleth rather than a science, a term which conveyed more comfort than meaning to those that used it. It was bound up with the replacement of vitiated air by fresh air, though what constituted vitiated air was not specified with any precision. Little wonder that engineers, striving to meet indefinite requirements, only succeeded at times by happy chance, and more often lamentably failed. New conceptions have now been introduced which, while not disregarding the chemical aspect of the subject, take into account also the cooling power which is largely a function of movement. It is indeed now accepted that neither the chemical purity of the air nor the temperature (whether dry or wet bulb) is an accurate index of the physiological effect of the environment, but that in addition to both of these the rate of movement of the air must also be estimated. The matter has been extensively explored in this country for the Medical Research Council by Dr. Leonard Hill and his colleagues, and in America by C. K. Drinker, C. P. Yaglou, and others. The knowledge already acquired has been applied by the Industrial Fatigue Research Board with considerable success to factory premises, particularly where some abnormal condition of heat or humidity prevailed, as in steel smelting or humid weaving. The most recent report[1] on fan ventilation in a humid weaving shed describes an experiment made for the Departmental Committee on Humidity in Cotton Weaving, which was appointed in November, 1924, by the Home Secretary.

The effect of suitably arranged electric fans on atmospheric conditions in the shed, on warps, and on output, and the effect of humidity and temperature on warp breakages and on output were studied, and special efforts were made to ascertain the opinions of the weavers on the innovation. The general conclusions reached were as follows: (1) The cooling power of the air and bodily comfort of the operatives were considerably increased by the particular arrangement of fans adopted. (2) Without fans, the cooling power of the air never reached the minimum standard considered necessary for workers engaged in sedentary occupations. (3) By running the fans at different speeds according to the atmospheric conditions in the shed, it was possible to maintain a fairly uniform rate of cooling until a temperature approaching 85° F. was reached. Above this temperature more powerful fans would be necessary to preserve the same effect. (4) Equally satisfactory results were obtained by the use of other smaller fans which were effective over the area covered by four looms under the control of one weaver. (5) The increased air movement produced by the fans had no significant effect upon the number of warp breakages on the looms in their immediate vicinity. (6) There were indications that the output on the looms affected by the fans was somewhat higher on the days when the fans were running. (7) The number of warp breakages decreased as the relative humidity increased. (8) The number of warp breakages decreased as the temperature increased. (9) The highest output was obtained when the temperature was from 72·5° to 75° F. and the relative humidity 75 to 80 per cent. With higher temperatures and humidities the output decreased.

Investigations have also been extended to the more normal conditions of ventilation and heating, such as prevail in shoe or engineering factories, or in schools. The results obtained by Dr. H. M. Vernon and Mr. T. Bedford have been embodied in another report.[2] Generally speaking, the authors have not found that expensive artificial ventilating systems installed even in new factories, produce the desired results, which may be summarised as keeping the air in such motion as to give a sensation of freshness and keeping the feet warm and the head cool. On the whole, natural systems of ventilation are regarded as preferable, being more pleasant and more healthy. The report contains a number of tables and diagrams embodying the details of a large body of observations carefully made. Natural ventilation by windows, particularly in summer, is pronounced to be good. Exhaust ventilation may be of some advantage, especially in winter, but it should not be at the floor level. The plenum system was found to compare disadvantageously with other systems. Heating is best effected through surfaces warmed to a fairly low temperature, and placed either in the floor or as near as possible to the floor. An ideal method would be to place hot-water pipes or radiators under the floor so as to heat the whole of the floor material, as in the old Roman hypocaust. Thus we find the researches of modern science justifying the old-time usage—the open window and the heated floor—in contrast to the more expensive, complicated, but misdirected efforts of recent days. Evidence is quoted confirming the fact that even moderate differences in atmospheric conditions exerting a definite influence on well-being as measured by lost time. The more does ventilation diverge from the optimum standards, whether on the side of excess or of deficiency, the more does lost time for sickness increase.

[1] Fan Ventilation in a Humid Weaving Shed. By S. Wyatt, M.Sc., assisted by J. A. Frazer, M.A. Edin., and F. G. L. Stock. Medical Research Council. Industrial Fatigue Research Board Report No. 37. H.M. Stationery Office. 1*s.* 9*d.*

[2] A Physiological Study of the Ventilation and Heating in Certain Factories. By H. M. Vernon and T. Bedford. Medical Research Council. Industrial Fatigue Research Board Report No. 35. H.M. Stationery Office. 1926. 3*s.*

POLONIUM AND THE TREATMENT OF SYPHILIS.

QUITE early in her classical investigations into the radio-active substances present in pitchblende Madame Curie isolated a very active element which was named polonium in honour of her native country. This substance is now also known as Radium F and is one of the final disintegration products in the uranium-radium series, closely resembling bismuth. It is this close resemblance to bismuth which has led C. Levaditi and others to experiment with polonium in the treatment of syphilis. They have recently reported[3] the effects of intravenous injections of polonium in the case of rabbits with chancres produced by inoculation with the syphilitic virus. Since polonium is intensely radio-active its presence and its concentration in any organ of the body can be determined by radiological methods; as a further experiment spirochætes were taken from the chancres after the injection of polonium and examined for motility. A solution containing

[3] Compt. Rend. du Soc. de Biol., May 8th, 1926, p. 1179.

200 electrostatic units of polonium was injected intravenously into three rabbits, all with chancres on the scrotum, and they were killed on the third, fifth, and tenth days respectively after injection. The various organs of the body were then examined. The shadows cast by each organ on photographic plates was noted as a sign of the amount of polonium it contained; histological investigations were also made. The results showed that polonium injected intravenously could be found in a relatively important proportion at the site of a primary syphilitic lesion. By comparing the radiographic and histological findings it was ascertained that the necrosed central portion of the chancre contained no polonium, which accumulated particularly in the zone of reaction around the necrotic area. In each case polonium was found in greater concentration in the principal organs of elimination, such as the kidneys, liver, and lungs. On the other hand, the amount of polonium at the site of the chancre became progressively greater in the days following its injection while the amount in the liver and lungs rapidly diminished. Despite this apparent concentration at the site of the primary syphilitic lesion, however, there appeared to be no appreciable action on the spirochætes removed for examination. The dose of polonium employed was very small on account of its extreme "physical" toxicity, and despite the negative results obtained with regard to the destruction of spirochætes the experiments here described do appear to indicate that there is probably a definite concentration of heavy metals at the site of a syphilitic lesion. Such an indication is important in view of the resemblance between polonium and bismuth, for bismuth has now become an important addition to the list of drugs used in the treatment of syphilis.

BRITISH HOSPITALS ASSOCIATION.

SEVERAL important subjects came up for discussion at the Sixteenth Annual Meeting and Conference of the British Hospitals Association held at Portsmouth on June 24th and 25th, under the presidency of Sir Harold Pink, chairman of council. The proceedings opened with a paper by Mr. Herbert L. Eason (superintendent of Guy's Hospital, London) describing the movement to provide pensions for hospital servants and giving a critical summary of the scheme approved by the King Edward's Hospital Fund for London, which has now been laid before the hospitals by the Fund, and may well be adopted widely. Mr. Eason's explanation of the scheme elicited warm approval. Great interest was also felt in Sir John Paget's plea for an amendment of the law to allow hospitals to recover the costs of treating accident cases for which compensation is paid. It is obvious that the present situation is anomalous. If a person is injured owing to the negligence of a motor driver and is taken home to be treated, he can recover damages covering the expenses of private nursing and private medical attendance; but if he is admitted to a public hospital he cannot afterwards recover a penny to meet the cost of maintenance there, because the hospital is a charitable institution and could not sue him if he did not pay. Sir John Paget considers it wrong that the hospitals, which cannot refuse to admit a serious accident case, should be expected to give prolonged treatment of this kind without having their expenses covered. It may be argued, he said, that it is the business of a charitable institution to be charitable, and this he admits in so far as it applies to the actual victim of the accident. The present state of things, however, violates the old maxim of Roman law that he who gains the benefit should bear the burden; for it is the negligent motorist who gains by the efficiency of the hospital's service, because the compensation he will have to pay varies as the amount of permanent injury. On the second day of the Conference Dr. S. C. Dyke read an interesting paper on the Pathological Service of the General Hospital, in which he laid stress on the fact that "pathology is not ancillary to medicine; it *is* medicine, and a hospital without a pathological service is incapable of proper function." He discussed the place of the hospital laboratory in the scheme of panel practice and laid down some important principles of administration. We hope to give the subject fuller consideration shortly.

Modern Technique in Treatment.

A Series of Special Articles, contributed by invitation, on the Treatment of Medical and Surgical Conditions.

CLXXIX.—SPASM OF THE GLOTTIS IN ADULTS AND CHILDREN.

THE effect of spasm of the laryngeal muscles is to produce closure of the glottis, for, though the abductor muscles probably participate in the contraction, they are overcome by the more powerful adductors. In addition to the adduction of the vocal cords, there is closure of the ventricular bands and, in any strong spasm, contraction of the sphincter of the upper aperture of the larynx. The spasm is most frequently the reflex result of irritation in or near the larynx. It will, of course, occur in anyone who inhales a foreign body or an irritating vapour; but it also occurs occasionally with less powerful stimuli, as in a simple laryngitis or pharyngitis, and here we must invoke an excessive reflex excitability as a further ætiological factor. Secondly, any lesion which causes irritation of the recurrent laryngeal nerve in the neck or in the mediastinum may produce spasm; among these are aneurysm, neoplasms, and diseased glands in the neck or thorax. Thirdly, the cause may be a central nerve lesion, the laryngeal crises of tabes dorsalis; these resemble any other attack of laryngeal spasm, and may appear very early in the disease, before other symptoms have occurred to suggest the diagnosis. Fourthly, spasm may be of purely functional or hysterical origin, and may or may not be associated with globus hystericus, anæsthesia of the fauces, or other paræsthesiæ.

A typical attack of glottic spasm begins with a tickling sensation in the throat, followed by a fit of coughing; the glottis then closes, inspirations are taken with difficulty and accompanied by loud stridor, but expiration is unimpeded. In the severest cases the glottis is completely closed at the height of the attack, the signs of asphyxia are present, and there may be, though this is rare, complete loss of consciousness. The spasm in this severe form lasts but a few minutes; in many cases it is less complete, but persists for several hours.

Though very alarming to the patient, glottic spasm is not dangerous, except when due to serious disease, such as locomotor ataxy or thoracic aneurysm; it is only in such cases that tracheotomy is ever required. The attack is generally too short and sharp to leave much time for direct treatment. The fears of the patient must be allayed as far as possible, and he should be told to try to take quiet, shallow respirations through the nose. The inhalation of nitrite of amyl frequently gives relief, and the patient subject to these attacks should be advised to carry a 5-minim glass capsule of this drug for immediate use when required. The spasm always disappears under chloroform, which may be administered, when time permits, by the medical attendant; it need not be given to the extent of inducing anæsthesia. StClair Thomson recommends, for inhalation, a breakable glass capsule containing chloroform ℥x., menthol gr. ½, and ethyl iodide ℥v. A hot sponge applied over the larynx is a useful minor measure. In the more persistent form, especially if associated with laryngitis, an emetic dose of ipecacuanha is a most valuable method of allaying the spasm; 30 gr. of the powdered root, or 20 gr. of the root combined

with half a grain of tartarated antimony, or 4 to 6 drachms of the vinum ipecacuanhæ may be given. In the persistent cases, also, a dose of chloral (15 to 20 gr.) may give relief. For the preventive treatment between the attacks, any exciting cause should be discovered and treated, particularly pharyngitis, chronic laryngitis, over-indulgence in tobacco or alcohol, and indigestion; in some patients a spasm is readily induced by drinking cold fluids, which must then, of course, be forbidden. A general tonic and hygienic régime is indicated, and a change of air and scene is often of value. Little can be expected from drugs, but a course of a mixture containing sodium bromide gr. x., with tincture of nux vomica ℥vi., three times a day may be useful. Hysterical cases usually show an obstinate tendency to recurrence; and, in those due to aortic aneurysm or mediastinal tumours, the treatment is, of course, purely symptomatic. The laryngeal crises of tabes are usually quickly relieved by inhalation of amyl nitrite.

Glottic Spasm in Children.

Because of their high reflex excitability, children are much more liable than adults to spasm of the glottis as a result of local or reflex irritation and, by reason of the relatively small size of the laryngeal lumen, a degree of narrowing which in the adult would cause little trouble produces in a child severe and urgent dyspnœa. Spasm plays an important part in most forms of laryngeal disease in children, and therefore their dyspnœa is characterised by exacerbations, which usually occur at night, and by intermissions, either complete or partial, according as the spasm is the sole or the partial cause.

Laryngitis Stridula.—In some children spasm readily occurs in the course of a catarrhal laryngitis, and produces the condition called *laryngitis stridula* or "false croup." The child has a cold, with slight pyrexia and hoarseness, but during the evening or night respiration becomes embarrassed and inspiratory stridor ensues with recession of the ribs and epigastrium and, in some cases, an alarming degree of asphyxia. The symptoms tend to subside towards morning, but may be repeated during the next few nights, though nearly always with diminishing severity. The child must be put to bed in a warm but well-ventilated room. At the onset one or two grains of calomel should be given, and repeated in three hours, until the bowels have acted freely, and the drug may usefully be continued in half-grain doses three times a day; one minim each of tincture of aconite and vinum antimoniale may be given every two or three hours. If any dyspnœa appears, an emetic is the best means of allaying the spasm and of clearing the bronchial tubes of secretion; ipecacuanha is by far the best drug for this purpose, and may be given to a child of 2 years of age in doses of 1 drachm of the wine, or 5 gr. of the powdered root, every half hour until vomiting occurs. Whitla recommends 10 minims each of vinum antimoniale, vinum ipecacuanhæ, and syrupus scillæ in a teaspoonful of water every 15 minutes until vomiting is produced. When the child has recovered any predisposing source of irritation must be sought out and treated. In a large number of cases this is in the pharynx; in fact, children subject to laryngeal spasm nearly always have adenoids and enlarged tonsils, which must be removed; gastro-intestinal disturbances should receive treatment, and cod-liver oil, malt, and preparations of iron are helpful during convalescence.

Laryngismus Stridulus.—There is another form of "false croup" in which there is no inflammation or other disease of the larynx; this is called *laryngismus stridulus*, and occurs in feeble, unhealthy children, usually between the ages of 6 months and 2 years, often in association with rickets, and nearly always with adenoids or enlarged tonsils. The attack is shorter and sharper than that of laryngitis stridula and, like it, often occurs at night. In a typical severe attack the child awakes suddenly struggling for breath, with inspiratory stridor, retraction of the lower ribs, and cyanosis; at the height of the attack air may completely fail to enter, and there may be convulsions, carpo-pedal contractions, and evacuation of urine; the end comes with a long crowing inspiration, and the child then generally goes to sleep. Death during an attack is very rare, but a feeble child may become worn out and die from pulmonary collapse. Shorter and milder forms are more common, and are called by nurses "passion-fits." Laryngismus has usually been ascribed to spasm of the glottis, but a simpler explanation may hold good for some cases; a child with nasal obstruction from adenoids becomes partially asphyxiated while asleep and, under the deep gasping inspiration which follows, the soft flaccid laryngeal walls are sucked in and close the lumen. In the treatment of the attack, it must be remembered that it lasts but a few minutes, and that there is only time for rapidly acting measures. The quickest and most effective method is to pull the epiglottis forward with the forefinger passed to the base of the tongue, a manœuvre which can easily be taught to mother or nurse; other measures are to stimulate the conjunctiva by touching it with the finger, the lips by brisk rubbing with a towel, the face by cold sponging, or the nasal mucosa by tickling with a feather, or by smelling salts or inhalation of nitrite of amyl. There is no time for the hot bath sometimes recommended, nor for tracheotomy or intubation, which would in any case hardly ever be necessary. Of preventive treatment, the most important is the removal of adenoids and enlarged tonsils; overloading the stomach must be carefully avoided, and the bowels should be regulated. Most of these children, being "delicate," are clothed too heavily and kept in overheated rooms. As much time as possible should be spent in the open air, and a reasonable amount of exercise should be taken. A change of air, especially to a high, dry locality, is of value; Moritz Schmidt found benefit in moving a child to the top floor of the house. Of drugs, cod-liver oil and iron tonics are the most helpful; sedatives, such as bromides and chloral, are depressing and should be avoided; Eustace Smith recommended liquid extract of grindelia, which may be given in milk or sweetened water in doses of 10 to 30 minims four times a day. The affection, in short, is most successfully treated if regarded as the result of debility rather than of excessive nervous excitability.

HAROLD BARWELL, M.B. Lond., F.R.C.S. Eng.,
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TUNBRIDGE WELLS GENERAL HOSPITAL.—In 1928 the hospital will celebrate its centenary, but it is unlikely that the existing building in Grosvenor-road will still be in use at that time. The building has outgrown its requirements, and rather than face an expenditure of £30,000 on alterations the governors on June 21st unanimously decided to erect a new hospital on an eight-acre site at Great Culverden, Mount Ephraim. The total cost has been put at £80,000, but it is proposed to sell the freehold of the Grosvenor-road site, and certain other funds are available. Probably about £35,000 will have to be raised by public appeal. The new scheme includes provision for 150 beds, a nurses' home, and an administrative block, and also for the carrying on in the same building the work of the Eye and Ear Hospital. It is likely to receive hearty support.

NEW TORBAY HOSPITAL.—A year ago Mrs. Ella M. Rowcroft, of Pilmuir, Torquay, gave a sum of £100,000 to purchase a site for the new Torbay Hospital; this brought her gifts to the Torquay Hospital Committee to a total of £123,000. On June 26th, in the presence of about 3000 people, Mrs. Rowcroft laid the foundation-stone of the new building at Hengrave, Torquay. The site chosen is about a mile from the present hospital, in rural surroundings, and particular attention is to be paid to the provision of good accommodation for the medical and nursing staff. The present hospital has long been entirely unsuitable, both from the point of view of the needs of Torquay and the comfort of the staff. It is expected that the new hospital will be completed in about 18 months, and the committee in charge is now engaged in raising an endowment fund of £40,000.

Special Articles.

ALL-SICKNESS INSURANCE RATES FOR WOMEN PROPOSERS.

THE excess of sickness among working women over corresponding groups of men in analogous occupations has long puzzled those who would fain believe that it is a myth invented by anti-feminists to keep women out of the labour market. As far as the class of teachers goes, Dr. Letitia Fairfield, in an address to the London Association of the Medical Women's Federation, which is published on p. 5 of our present issue, confirms the fact that the morbidity-rate is much higher among women than among men teachers. If confirmation were wanted of the circumstance it could be sought in the very limited facilities offered by insurance companies to women to take out sickness policies. The following companies do not entertain proposals from women for policies which include the risk of all sickness: Royal Insurance Company, Scottish Union and National Insurance Company, Yorkshire Insurance Company, Employers' Liability Assurance Corporation, Cornhill Insurance Company, Excess Insurance Company, London and Liverpool and Globe Insurance Company, Ltd. Certain companies offer accident and sickness insurance to women, but only to those engaged in a profession or occupation. Others limit policies still further, accepting only unmarried professional women. An analysis of some of the policies open to women, which does not pretend to be either exhaustive or complete, is set out below. Only policies which include all sickness are dealt with and only the more important details are included.

Eagle, Star, and British Dominions Insurance Co.

Since 1919 policies have been issued to women. Women between 16 and 60 actively engaged in a business or profession can insure against all accidents and all illnesses under Table 3 at an annual premium of £2, £4, or £8. For the last-named sum the following benefits may be obtained: In the event of accident causing (*a*) death, £500; (*b*) loss of one hand, foot, or eye, £250; (*c*) permanent total disablement (other than loss of limb or limbs), £3 a week for 52 weeks, afterwards £50 a year; (*d*) loss of both hands, feet, or eyes; or one hand and one foot; or one hand or one foot or one eye, an annuity for life of £50; (*e*) temporary total disablement, per week up to 52 weeks, £3; (*f*) in the event of illness or disease causing total and irremediable blindness, or permanent general paralysis, £3 a week for the first 26 weeks of disablement, followed by an annuity of £50; (*g*) in the event of illness or disease causing temporary total disablement (with or without confinement to the house), £3 a week, payable for 26 weeks. To obtain the same benefits and certain additional ones, of which perhaps the most appreciated must be the benefit named under (*g*) for 52 weeks as against 26, a male proposer in Class I. would pay an annual premium of only £6—that is, three-quarters of that paid by a woman engaged in clerical, educational, domestic, and superintending duties, or by shop assistants not using machinery. Dancing mistresses, dressmakers (working), gardeners, health visitors, and shop assistants using hand machinery pay 10 per cent. extra for this policy, and car-drivers, farm hands, masseuses, nurses, and policewomen 20 per cent. extra. Marriage on the part of a working woman does not affect her policy, but death, loss, or disablement resulting from child-bearing or from venereal disease are excluded. Women not actively engaged in a business or profession can be insured under Table 3A, paying the same annual premium, £8. The risks of accident are evidently considered less great: for example, the death benefit is £600 instead of £500, and for temporary total disablement following accident £4 instead of £3 is payable for 52 weeks. Under Table 3A for temporary total disablement due to disease, with confinement to the house, £4 a week is paid up to 26 weeks; without confinement to house, £2 a week up to four weeks.

Friends' Provident and Century Life Office.

Insurance under Table 2 is offered against accidents and all illnesses to women engaged in a business or profession. Policies are issued only to single women and cease upon the marriage of the insured. The benefits obtainable for an annual premium of £6 are (*a*) death by accident, £500; (*b*) loss of two limbs, or of both eyes, or of one limb and one eye, by accident, £500; (*c*) loss of one limb or one eye by accident, £250; (*d*) temporary total disablement by accident, £3 a week for 52 weeks; (*e*) temporary partial disablement by accident, up to 52 weeks, £1 a week; (*f*) temporary total disablement by illness of any kind involving at least one week's disablement, £3 a week up to 26 weeks; (*g*) convalescence, £1 10*s.* a week up to four weeks. The premiums quoted apply to proposers between the ages of 18 and 40 engaged in clerical, educational, commercial, and the like occupations. The company issue a "minimum cost" policy to male proposers for an annual premium of £4 10*s.* a year—again three-quarters of the premium payable by women. For this (*a*) the sum to be received in the event of death resulting from an accident is £500; (*b*) for total disablement due to accident or sickness of any kind a sum of £4 a week is paid, up to a cumulative period of 26 weeks in respect of each accident, or in case of sickness to a cumulative period of 26 weeks in respect of all illness occurring in any one year of insurance: (*c*) medical and surgical fees are paid up to a sum equivalent to one-sixth of the benefit payable in respect of temporary total disablement.

Ocean Accident and Guarantee Corporation.

Women between 18 and 50, married or unmarried, who are engaged in a profession or business and incurring average risk can for a premium of £9 9*s.* a year obtain the following benefits: In case of accident causing death, or loss of hands or feet or eyes, or of one hand or foot and one eye, or of one hand and one foot, £600; loss of one hand or foot or eye, £300; total disablement, per week, £3; partial disablement, per week, 15*s.* Permanent total disablement not otherwise compensated: For the first 52 weeks of disablement, per week, £3; for the following ten years an annuity of £50, which annuity is also payable in the case of total and irremediable blindness, or permanent paralysis of two limbs, not caused by accident. Total disablement caused by certain specified illnesses, per week, £3; total disablement for not less than seven days caused by any other sickness, per week, £3. Death or disablement consequent upon pregnancy and childbirth is excluded. The weekly compensations are payable up to 52 weeks and confinement to the house is not exacted.

The all-sickness and accident policy offered to male proposers by this company gives exactly parallel benefits for an annual premium of £6 6*s.* to those in Class I. occupations (including medical practitioners). The sole difference in the prospectus appears to be that the limit of age for male entrants is 55 (against 50). The difference of premium is as two to three between males and females in this company—that is slightly less favourable to the females than in some of the others, but, on the other hand, no extra benefits are offered to the males.

London Guarantee and Accident Company.

This company offers all-sickness and accident insurance to women engaged in professional, commercial, and industrial life. The benefits include the following: £25 on death from accident or sickness; an annuity of £50 on permanent disablement through loss of two limbs or two eyes, or on permanent loss of sight of two eyes by disease, or on

permanent paralysis of two limbs by disease; £500 on loss of one limb and one eye following accident; £250 on loss of one limb or one eye by accident; £3 a week on temporary total disablement, and £1 a week on temporary partial disablement, caused by accident, in each case up to 52 weeks in respect of any one accident; £3 a week on temporary total disablement, caused by sickness, without confinement to house (up to four weeks); £3 a week on temporary total disablement caused by sickness with confinement to house (up to 26 weeks for any one sickness); £3 a week during convalescence from sickness (up to four weeks). For these benefits women in Class I. (engaged in professional, educational, and clerical duties, and non-hazardous shop risks) pay an annual premium of £6 10*s*. Death, loss, or disablement through accident or sickness associated with or incidental to child-bearing is not covered. Policies are renewable from year to year by the joint consent of the policyholder and the company, but insurance ceases when the policyholder reaches 55. The age-limit for entrants is 20 to 45. The personal accident and sickness insurance offered to male proposers (Table 4 "Standard") differs so greatly in the details of benefits offered that it is not easily comparable.

Law Accident Insurance Society.

This company offers to women, for selected lives only, policy W.3, covering accidents and all sickness. The benefits obtainable for women entering between the ages of 18 and 50, and ceasing when the assured reaches 60, are as follows: Death by accident, £500; loss of two limbs or two eyes, or one limb and one eye, £500; loss of one limb or one eye, £250. Temporary total disablement by accident or sickness (*a*) involving confinement to house, weekly £2; (*b*) without confinement to house, weekly £1. Temporary partial disablement by accident, weekly 10*s*. The weekly compensation is payable up to 52 weeks for accidents and up to 13 weeks for sickness. For these benefits women engaged in non-hazardous business or professional duties pay a premium of £4 10*s*. per annum, and women not engaged in any business or profession pay £6 per annum. Policies are annual contracts. Accidents or illnesses associated with or incidental to child-bearing are not covered.

Medical Sickness Annuity and Life Insurance.

Permanent sickness and accident policies are issued to women medical and dental practitioners, subject to the following special conditions: (1) the age at entry must not exceed 35 next birthday; (2) those holding whole-time salaried appointments may only take policies under Table A3 (Women), excluding first three months illness, or A3/6 (Women) excluding first six months illness. Under Table A (Women) a doctor or a dentist not excluded by this condition may, for example, insure £6 6*s*. a week for the first 26 weeks of total incapacity and £3 3*s*. a week thereafter, up to the age of 65, for an annual premium of £15 8*s*. if her age next birthday is 30. Sickness benefit is payable from the first day of incapacity. Confinement to bed, bedroom, or house is not exacted. The benefits granted include the risk of marriage, but exclude all sickness benefit from the time of pregnancy to three months after the termination of pregnancy, and no premium is payable for such period of exclusion. In the event of the assured discontinuing practice for any reason other than incapacity all liability of the company under the policy ceases.

The sickness and accident benefit policy (Table A) offered to male doctors and dentists is comparable as regards benefits received. A man whose age is 30 next birthday would, however, obtain these benefits for an annual premium of £10 18*s*. 6*d*., and the holding of a full-time appointment does not disqualify him for this policy. Moreover, the age of entry for male proposers may be as late as 55 next birthday, and there is no clause providing for the cessation of liability under the policy if the proposer ceases practice for any reason. Male proposers may also insure under Table A2, receiving the same benefit as under Table A, with quinquennial rebate of 5 per cent. of all premiums paid during such period if no claim has been made under the policy during the said quinquennium. This alternative is not offered to female proposers. The special feature of this society's all-sickness and accident contracts for both sexes is that once a policy has been granted it cannot be discontinued by the society except on account of fraud, non-payment of the premium, or permanent residence abroad.

Conclusion.

It seems quite possible that the caution exercised by those companies who refuse to entertain proposals from women, even at high rates, is excessive. There can be but few figures available on which the sickness rate has been worked out, and it is probable that the actuarial calculation of the risk from published statistics is not based on figures which give a true picture of the health of the modern working woman. It should be easy to collect information as to the morbidity-rate in nurses at general hospitals. This is a most strenuous occupation, but we believe that sick leave is relatively rare not only during the four years' training, but also among staff nurses and sisters in the permanent service of the hospitals. It is even possible that were women encouraged to insure against sickness the morbidity-rate might improve, since the dread of falling ill is often at least a contributory cause of bad health. We have set out in some detail the facilities which are open to women in the hope that they may be useful to practitioners who wish to provide against this source of anxiety among their patients. It seems likely that if a large number of policies were taken out it might be found possible to drop the rates, for at the moment they must be largely speculative. Further investigations, similar to that carried out by Dr. Fairfield, may yield valuable results.

SOME RECENT STUDIES OF DYSENTERY.

Cultivation of the Amœba.

MANY problems, bacteriological, clinical, and therapeutical, still remain to be solved in dealing with the various forms of dysentery. Recent work, particularly on the bacteriological aspect of the problem, has brought to light some interesting facts. Drs. W. C. Boeck and J. Drbohlav [1] have described the cultivation of the *Entamœba histolytica*. The cultivation of this organism has only once before been carried out successfully by Culter in 1918, and his work has been severely criticised and not hitherto confirmed. The initial cultivation of the *E. histolytica* by Boeck and Drbohlav was achieved by accident. A small amount of fæces was inoculated into two tubes of Locke egg-serum medium as a routine procedure in a study of intestinal flagellates, and on examination of the cultures a few days later many amœbæ were found. These were identified as *E. histolytica*, and further culture experiments showed that the best media for the purpose were Locke egg-serum and Locke egg-albumin. An initial alkaline reaction of pH 7·2 to 7·8 is necessary and the optimum temperature is 37° C. The fact that non-parasitic saprophytic amœbæ occasionally occurring in the fæces can readily be grown in artificial media made it very necessary to test the pathogenicity of the organisms cultivated by Boeck and Drbohlav, and these authors therefore carried out a series of animal inoculation experiments with kittens. Rectal inoculations of amœbæ direct from an infected patient and also from cultures produced typical dysentery, ulcerative colitis, and hepatic abscess in these animals. The virulence of the organisms was not affected by prolonged cultivation.

[1] Amer. Jour. of Hyg., 1925, v., 371.

Immunisation against Bacillary Dysentery.

The production of immunity against dysentery, upon lines which proved so successful in the case of typhoid in the late war, has long engaged the attention of bacteriologists. It is, perhaps, not a clamant necessity in ordinary conditions of life, but becomes one the moment any great upheaval, such as wars, famines, and earthquakes, causes a violent disorganisation of normal social conditions. A successful method of bringing about active immunity to this disease would be one to be held in reserve against emergency, or only applied under present conditions in this country in asylums or institutions in which epidemics of bacillary dysentery might occur. None the less, the problem is an important one, and in countries less happily situated hygienically a pressing one. The difficulty in the way of applying the method used for typhoid, without modification, is the extreme severity of the reactions set up by the injected organisms; these are exceedingly unpleasant and unlikely to be tolerated by the average population. From time to time various attempts have been made to modify the toxic properties of the organisms without interfering with their antigenic value, but none of these has as yet gained general recognition. In the current number of the annals of the Pasteur Institute[2] J. Dumas, Ramon, and S. Bilal put forward a further method, which has been suggested by studies upon diphtheria anatoxin. It has been found by Ramon that diphtheria toxin treated with formol becomes modified, so that its toxic properties are destroyed, but its capacity to provoke antitoxin production when injected into the animal body, and to combine with antitoxin is retained. In working with dysentery the anatoxin is prepared by treating a toxic filtrate of a 15 days old broth culture of *B. dysenteriæ* Shiga with formalin at incubator temperature, under which circumstances the toxin is found to become less potent and finally, at the end of about one month, to be practically non-toxic. With regard to the antigenic properties of this substance its injection into animals appears to result in both an antitoxic and antibacterial immunity, whilst in its use in immunising horses, for the production of antidysenteric serum, it has not been found to produce the severe reaction occasioned by the unaltered toxin although giving rise to an efficient therapeutic serum. In the human subject the method has only been tried on a small scale, and whilst it is certain that some reaction results from its use, this is stated to be less than that observed after antityphoid inoculation. The authors show praiseworthy caution in stating that the success of their procedure cannot be assumed until it has been extensively put into practice under epidemic conditions.

Castor Oil versus Saline Aperient.

Dr. A. J. Boase[3] has described the use of castor oil as opposed to saline aperients in the treatment of bacillary dysentery in Kenya. This treatment was introduced in that country in 1924, and Boase has investigated 117 consecutive cases of bacillary dysentery occurring among convicts with regard to these two main methods of treatment. Of these 45 were treated with saline aperients in the routine fashion with a death-rate of 8·8 per cent. and a relapse-rate of 29 per cent. The remaining 72 cases received two ounces of castor oil on admission and on subsequent days 1 drachm hourly for eight doses until the day when the stools ceased to show blood and mucus. This usually occurred about the third day and a saline purge was then given to relieve any constipating effect of the castor oil. Among these cases the death-rate was 2·8 per cent. and the relapse-rate 11 per cent. These figures certainly seem to indicate the value of castor oil at any rate in this particular epidemic. There appears to be some scientific basis for this form of treatment, since absorption of toxins from the small intestine is undoubtedly an important factor in the intoxication produced in dysentery, and a drug which will hurry on the intestinal contents rather than lead to even the slightest delay is bound to be beneficial. An important point with regard to the castor oil treatment lies in the diet which is not restricted, as occurs when the saline aperients are used, but allowed to be almost full. The number of patients treated is certainly small, but the results point to an important innovation in the treatment of bacillary dysentery.

Serum Treatment of Bacillary Dysentery in Children.

In Australia Dr. R. Webster and F. E. Williams have been examining the dysentery bacillus in its relation to the so-called "summer diarrhœa" of infants and young children.[4] Although the dysentery bacillus as a cause of infantile diarrhœa does not appear to be nearly as common in the Commonwealth as, for example, in America, yet Australian work indicates that other parts of the world beside America find this type of the disease of some importance. The dysentery bacilli isolated from the stools of infants and young children over a period of nearly three years were mostly mannite fermenters, the Shiga group being a negligible factor. Of the Flexner group the "W" strain appeared most commonly while the Sonne bacillus also assumed importance, especially at certain portions of the period under review. The mortality-rate for the various members of the Flexner group did not appear to vary with the strain, being in the neighbourhood of 50 per cent., for example, in the season 1923–24. Such a high mortality-rate makes the question of specific serum treatment of great importance, and Dr. Webster deals with this in the second part of his paper. Serum injected after a lapse of four to five days of illness appeared to be quite ineffective in reducing the mortality or modifying the course of the disease, while in six cases in which serum therapy was instituted within 48 hours of the onset of the disease recovery took place in five cases. Such results illustrate the need for early diagnosis, and Dr. Webster emphasises the appearance of blood and mucus in the stools of such cases as being strong presumptive evidence that the dysentery bacillus is the cause. A prompt bacteriological report is also necessary, and Dr. Webster has elaborated a technique which enables him to identify the dysentery bacillus in the same time as a throat swab can be reported on for the diphtheria bacillus. Polyvalent serum has been used up to the present, but the suggestion is put forward that monovalent serum for the "W" and "V" strains of the Flexner group should be prepared and used since these appear to predominate, and a method for the rapid identification of the serological race of an organism is now under consideration.

[2] Anatoxine dysenterique. Annales de l'Institut Pasteur, 1926, xl., No. 2.
[3] Kenya Med. Jour., December, 1925, ii., No. 9, 245.

MEDICINE AND THE LAW.

Identification by Finger-prints.

THE law courts, at any rate for the purposes of criminal trials, often show a reluctance to accept results which science has established. The system of identification by finger-prints has provided an example of this hesitation. In Rex *v.* Chadwick, a case tried at Birmingham in 1908, the accused was charged with burglary. The burglar had left finger-prints upon a champagne bottle and it was proved in evidence that they coincided in no less than 12 of the ridges with the finger-prints of the accused. The judge advised the jury not to accept this evidence; the jury, however, found the accused man guilty nevertheless. A clearer example of the value of the system occurred in 1916 at the Old Bailey when a man was charged with breaking into Sadler's Wells Theatre and stealing Treasury notes. It was proved that his

[4] Med. Jour. of Australia, Dec. 5th, 1925, p. 648.

finger-prints coincided in 32 ridges with prints found on a broken window-pane at the theatre. The accused man's finger-prints were taken (with his consent) in court, and, though he denied his guilt, the jury found the evidence of identification adequate and convicted him. Possibly more use of the system would be made in criminal trials if it were not regarded as unfair to ask the accused to allow his finger-prints to be taken. It is, of course, objectionable to prove a man's finger-prints from records in the possession of Scotland Yard while his innocence or guilt is being determined, because such an action gives the jury a hint that he is a man of bad character who has already been convicted before. The law does not allow such hints to be given. Not many months ago goods were stolen from a warehouse; a woman standing opposite the premises had noticed a man with a hand-cart whom the police supposed to have been the culprit. She was shown by a detective several photographs of convicted thieves and she picked out one of the portraits as that of the man she had seen. At the trial, during her examination-in-chief, the prosecution most improperly asked questions which elicited the fact of her having identified the accused man from police photographs. The man was convicted, but the Court of Criminal Appeal quashed the conviction, the Lord Chief Justice severely criticising the irregularity which had prevented the accused from having a fair trial. Similarly, no doubt, evidence identifying a man by finger-prints purporting to come from the archives of Scotland Yard (and therefore indirectly establishing the fact that he was a man of bad character) would prima facie be inadmissible.

The main value of the finger-print system in criminal cases lies in the preliminary stages of investigation, or in proving the career of a prisoner after he has been convicted and before he is sentenced. Another use of the system was disclosed lately at an inquest in Poplar. A woman's body was taken from the Thames on June 7th. She was unidentified until the police took her finger-prints post mortem and thereby traced her, her previous career having been known to Scotland Yard. The coroner, Dr. R. L. Guthrie, asked if the taking of finger-prints in the case of unknown persons was not a new practice. The detective-inspector replied that it had been done for five or six years, but that this was the first case recorded in which a person had thus been identified after death. A few days later Dr. Harvey Littlejohn, professor of forensic medicine in Edinburgh, corrected the statement. In April, 1913, it appears, a man was found dead in a quarry near Edinburgh. The body being unidentified, the professor suggested the taking of finger-prints on the chance of the deceased having been known to the police. Scotland Yard was consulted, and by return of post replied giving the man's name, alias, place of birth, age, height and complexion, and the colour of his hair and eyes. The reply was accompanied by a photograph which left no doubt of the identity of the deceased. As Prof. Littlejohn observes, the incident was a tribute alike to the efficiency of the finger-print department of Scotland Yard and to the value of the method in the identification of the dead. A later letter to the *Times* from the Chief Constable of Oxford mentions a case where a man apparently concerned in certain frauds in that city died suddenly and was identified with the aid of the finger-print records of Scotland Yard. The practice of taking the finger-prints of unidentified bodies is stated to be common in India.

Charge under the Venereal Disease Act.

The Venereal Disease Act forbids, as is well known, the advertisement of remedies and the offer of treatment by persons who are not qualified medical practitioners. Prosecutions under the Act have been remarkably rare. Mr. H. G. Muskett, appearing for the police in a recent case in the Clerkenwell police-court, stated that it was the first of such prosecutions which he had had to undertake since the Act began to operate in May, 1917. The summons was against Percy John Murrell, trading as the Orion Chemical Manufacturing Company. Mr. R. E. Dummett, the stipendiary magistrate, imposed a fine of £20 and ordered the payment of £5 5*s*. costs, with the alternative of two months' imprisonment. It will be recalled that Lord Trevethin's Committee in 1923 recommended that the law be altered to allow properly qualified chemists to sell approved disinfectants as a protection against venereal disease, the sale being accompanied by approved instructions. A Bill to effect this amendment of the 1917 Act is now before Parliament.

Partnership Disputes.

During a recent partnership dispute between doctors Mr. Justice Horridge, trying the case with a special jury, asked if some arrangement could not be reached before the case proceeded further, as both parties were on the high road to ruining themselves. They might be rich men, but he should have thought it was ruin for two doctors to go on fighting a case and be away from their patients for days. Whatever the result might be, it must be bad for their practice. In deference to the judge's suggestion counsel conferred, but the case proceeded. Next morning, however, a settlement was announced. As both plaintiff and defendant withdrew the charges which they had placed upon the pleadings, there is no occasion to deal with the evidence. It is sufficient to explain that the pleadings indicated that two medical men had entered into partnership in London, one having agreed to pay £2500 for a half share in the practice of the other. The purchase price was duly paid, except for the final £500, for which sum judgment had been signed. The purchaser counter-claimed for damages on the ground of fraud and misrepresentation (mainly as to the value of the practice); he also claimed the return of his £2000 and the rescission of the partnership agreement. Thereupon the other party pleaded that the purchaser suffered from chronic recurrent alcoholism, and was on that account incapable of constantly and regularly performing his part of the partnership agreement, and that, therefore, the court should dissolve the partnership. When the case was settled, each side withdrew its charges and stated handsomely enough that it was satisfied that they were without foundation. There is, therefore, no more to be said than the somewhat platitudinous reflection that it is a pity that such charges should be solemnly made before judge and jury if they can be whole-heartedly withdrawn within 24 hours, and that the publication of disputes of this kind does good neither to the practitioner nor to the profession.

How are incidents of this kind to be avoided? If the court is likely to intervene to press a settlement upon the parties—a contingency by no means unlikely in cases of this nature—what is the good of running up lawyers' bills? Here were two partners each asking for dissolution of a partnership relation which at the moment was evidently intolerable to both. Why could they not save themselves friction, costs, and publicity by a simple mutual agreement to dissolve? The purchase money was, no doubt, a stumbling-block; but, if the parties could have referred this point to some umpire in whom both had confidence, a reasonable award by him as to the proportion of the purchase money to be retained or returned would have settled the dispute and left the parties vastly better off than after the briefing of fashionable counsel. Once personal charges of fraud or drunkenness are launched, a professional man must fight them with his last penny. But cannot disputes of this kind be submitted to some professional tribunal? Is there no means by which doctors entering into partnership can bind themselves to accept such arbitration? The presidents of the professional bodies of engineers and of architects are frequently called upon to appoint arbitrators (though not perhaps particularly in relation to

professional partnerships); the legal profession has machinery by which disputes between the two branches can be referred to the Bar Council for final decision. Has the medical profession sufficiently considered the provision of like facilities? It is lamentable enough when in the divorce court husband and wife launch charges in the endeavour (often frustrated) to dissolve a union which is irksome to both. It is ludicrous that the parties to a medical partnership, a form of union neither so personal nor so permanent, should follow suit.

Many partnership disputes could be avoided at the outset. If books are properly kept, and if intelligent inspection of them is obtained, it should rarely be possible in an honourable profession to plead fraud or misrepresentation as to the value of a practice. Lawyers and accountants can be of use here in advising upon figures or the absence of figures. But they can give no advice upon incompatibility of temperament, nor does the law provide any elastic method of dissolving partnerships which fail for purely personal reasons. The Partnership Act terminates partnerships automatically in certain cases —death, bankruptcy, illegality, expiration of agreed term, &c.—and allows the court a discretion to dissolve partnerships in certain other cases. The court may decree a dissolution if a partner—

(*a*) is a lunatic; or

(*b*) becomes in any other way permanently incapable of performing his part; or

(*c*) has been guilty of such conduct as, in the opinion of the court (regard being had to the nature of the business), is calculated to affect prejudicially the carrying on of the business; or

(*d*) wilfully and persistently commits a breach of the partnership agreement or otherwise so conducts himself in matters relating to the partnership business that it is not reasonable for the other partner or partners to carry on the business in partnership with him; or again

(*e*) when the business can only be carried on at a loss; or

(*f*) whenever circumstances have arisen which, in the opinion of the court, render it just and equitable that the partnership be dissolved.

In cases (*b*), (*c*) or (*d*) the court will not act at the instance of the partner who is to blame. There has not been much decision as to the circumstances which would make dissolution "just and equitable" under (*f*). Prejudicial conduct under (*c*) depends upon the nature of the business; adultery by a partner would not justify the dissolution of a partnership of merchants, but immorality by a member of a medical partnership has been held to suffice. Wilful persistent breach of contract under (*d*) has been explained to mean "studied, prolonged, and continued inattention to the application of one party calling upon the other to observe the contract." Unreasonable conduct does not mean mere squabbling and ill-temper, but a state of complete and permanent animosity making an impassable breach between the parties and destroying mutual confidence.

Thus Parliament and the judges have laid down the lines along which partnership disputes will be decided in actions at law. Is the procedure elastic enough? If not, what better machinery can be devised within the profession? Arbitration, as contrasted with legal proceedings in the law courts, has two drawbacks. First, it tends to be unexpectedly expensive, especially when it involves audience by legal representatives; secondly, the law courts are jealously inclined to seek occasions to intervene, unless the parties can eliminate this intervention by some specially wide and binding undertaking to accept the arbitrator's award on all points as final. But arbitration possesses the great merits in matters like medical partnership disputes that it avoids the washing of dirty linen in public.

EPSOM COLLEGE: THE ANNUAL MEETING.

THE annual general meeting of subscribers to the Foundation was held at the London Offices, 49, Bedford-square, W.C., on June 25th, Dr. Raymond Crawfurd presiding. The principal business before the meeting was the announcement of the result of the elections to the pensionerships, annuitants, and foundation scholarships. Dr. Crawfurd said that the number of votes gained by certain of the successful candidates implied the accession of new subscribers to the Foundation. In congratulating those who had been successful he asked the meeting to sympathise with those who had not, and pointed out that the ideal before the Foundation was to provide these benefits for all who stood in need of them. The secretary read the names of the successful candidates as follows:—

"Highett," "Pugh," and Ordinary Pensionerships.

	Votes.		Votes.
*Thomson, Malcolm E.	6636	‡Maitland, Clara B. ..	2176
*Staniforth, John W.	2365	†Alexander, John ..	154

* Ordinary Pensioners. ‡ "Pugh" Pensioner.
† "Highett" Pensioner.

The "R. R. Cheyne" Annuity.

	Votes.
Hope, Miss Frances S. J.	1931

Foundation Scholarships.

	Votes.		Votes.
Johnson, Everard S. R.	12,490	Matthews, Guy A. ..	6562
McDonald, Charles F. ..	12,083	Adams, John E. ..	6072
Galpin, Richard J. L.	11,066	Hudson, Eric J. ..	5159
Blakeway, Michael G.	8692	Cook, Robert S. ..	4315
Williams, Paul G. ..	6671	Rew, Kenneth G. R. ..	3800

A meeting of the Council followed upon the annual general meeting, when Dr. Crawfurd resumed briefly the activities of the past year. The school, he said, had now 345 boys, and the raising of the salaries of the teaching staff was reflected in the scholarship successes. He was glad to say that in the near future the British Medical Association and the Medical Insurance Agency would be represented on the Council. He alluded to notable acts of benevolence by which they had benefited, mentioning the gift of £1000 from Mr. William Tinker and the institution of a new exhibition arising out of a gift from Dr. H. R. Mosse. The Council, he said, had spent largely during the year but had not been forced into debt by doing so. A chemical block had been erected which would be opened by Lord Grey on next Founder's Day, July 24th; the library had been completely transformed to serve also the purpose of a reading room; and large and necessary structural changes had been made in the lower school buildings. The Works Committee had undertaken the centralisation of the heating of the building, and there had been a complete conversion of the lighting scheme which now depended upon electricity alone. These things in the main accounted for recent expenditure, and he went on to outline as the structural scheme of the future the building of a new infirmary, pointing out that the existing building, though unfitted for a modern infirmary, could be transformed into a boarding-house offering accommodation for some 40 more pupils. He mentioned that among the boys themselves there had arisen a movement for the erection of a new games' pavilion, and large as the sum required was he had reasonable hope that it would be forthcoming.

A vote of condolence was passed with the relatives of Sir Henry Morris, for many years the zealous treasurer of the College.

There followed the re-election of certain members of the Council retiring under time-limit and of the auditors, the election of Mrs. H. G. Tetley and Dr. E. Clinson Greenwood as vice-presidents, and the election of Sir William Hale-White as treasurer of the College in succession to Mr. H. S. Pendlebury, for whose services a hearty vote of thanks was recorded.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

Pan-American Red Cross Conference.

THE second pan-American conference of the Red Cross opened at Washington in the last week of May. Organised by the League of Red Cross Societies; it was attended not only by representatives of the Red Cross Societies of North and South America, but also by many allied organisations on these continents and by sister organisations from across the seas. It was pleasing, for instance, to hear a report from Mr. Hirosi Saito, a delegate of the two and a half million members of the Red Cross Society of Japan. The League of Red Cross Societies has been skilful in building an efficient organisation with a minimum of rigid regulation and red tape. As a result the representatives at the conference demonstrated a variety of interests as well as of nationality. At the same time the discussions all centred upon some phase of the established peace time programme of the Red Cross: struggle against disease, rescue in disaster, or education for health and goodwill.

The Department of Hygiene in the Republic of Paraguay has lately concentrated its efforts on the problem of leishmaniasis americana, a disease which ranks in importance there with tuberculosis, malaria, and syphilis. While appealing to research workers to help them solve the problems of its ætiology, they have not awaited a response before establishing preventive and curative stations. The Paraguayans are at present advised to bathe the body at the end of each day's work, to treat all bites of insects with antiseptics, and to take early medical advice on pustules which may be leishmaniasis in an early stage. The present treatment consists in cauterisation with silver nitrate followed by injections of tartar emetic.

Under the ægis of a national nursing association special tuberculosis nurses have been trained in Cuba, and are doing efficient work in the hospital, the dispensary, and the home. As a result of their educational campaign there has been a marked improvement in the standards of hygiene throughout the country. The Red Cross Society of Colombia has established, among other things, a health centre where maternity care is successfully given. The great event at this centre takes place on Tuesdays and Fridays of each week when "a select group of ladies . . . and some others who come with less regularity receive the dirty and malodorous children which the mothers bring there for that purpose, bathe them, rinse them, dress them with new clothing, and give them to their mothers completely transformed."

The Mexican Blue Cross.

An unusually interesting institution is the Mexican Blue Cross, founded in San Antonio, Texas, U.S.A., on Oct. 12th, 1919. Its object is to bring succour to the Mexicans—over a million of them—who live in the southern parts of the United States, and it has at the present time 269 outposts established in six southern and western States. Its work, as picturesquely described by its secretary and founder, Senor Jesus Franco, includes:—

"Distribution of food and clothes; providing doctors and medicines to the sick; visits paid to the hospitals and jails in which compatriots or persons of Spanish speech, are recluded, providing them with comforts and sending them fruits, candies, &c. Those who die without the attention of their relatives, leaving no resources, are piously buried by Sisters of the Mexican Blue Cross, the expenses being covered by the institution. Those that, on account of sickness or disgrace are unable to work, and for their lack of means are obliged to go back to their families in Mexico, are sent by the Mexican Blue Cross. . . The Mexican Blue Cross also labors in a moral way, inculcating a high spirit of sentiment, of fraternity and of love toward men, without any distinction; while at the same time we commend to our countrymen a high and eternal gratitude toward that hospitable country (the United States), and the observance of a blameless behavior, based in the respect of the law and righteousness."

The work of such an organisation must surely promote understanding and cement friendship between Mexico and the United States.

NEW ZEALAND.

(FROM OUR OWN CORRESPONDENT.)

Paying Wards in Hospitals.

THE question of community hospitals, or in plainer English the establishment of paying wards in public hospitals, is much under discussion, and here as elsewhere it presents great practical difficulties. These are partly due to the methods of hospital administration in vogue, which differ materially from those in England. From 1853 to 1876, when the country was divided into provinces, hospitals were administered locally. From 1876 to 1886, after the abolition of provinces, there was great lack of uniformity in the hospital management, the amount of voluntary contribution varying in different districts; in some it was quite considerable. In 1885 and subsequently Acts were passed establishing the present system, which is briefly as follows: The country is divided into some 40 districts, each under its own hospital board, popularly elected. Each board imposes a rate according to the estimated cost for the year, on which it receives a pound-for-pound subsidy from the Government. This method may have equitably distributed the cost of hospitals over the community, but it has had the effect of abolishing voluntary subscriptions, though handsome donations have been made for specific purposes. The hospitals were originally established for the indigent (of whom there are now very few) and for those who can pay a maintenance fee of 9*s*. a day. In most of them the medical staff is honorary, although in some districts small stipends are offered.

This restriction of the hospitals to the poorer section of the public is not likely to remain, for in 1924 the Government, following the decision of a Hospital Commission, definitely declared that the public wards of the hospitals were available for rich and poor alike, which has raised a very live issue for their honorary staffs. Abuse of hospitals is not unknown here, and in view of the growing need for hospital accessories—such as X rays and bacteriological investigation—in private practice, and the great convenience of public hospitals as affording them, a movement is on foot to establish paying wards. This movement started long ago but has been considerably stimulated by the Government pronouncement. In 1920, at the first congress after the war, the New Zealand branch of the British Medical Association passed a resolution in favour of paying wards, and in spite of some notable dissentient divisions it has held to this policy. Since the visit of Dr. William Mayo and other distinguished Americans to New Zealand and the visit of New Zealand doctors to the American College of Surgeons in 1924, the American conception of the community hospital has been extensively advocated, and Dr. McEachern, of the American College, has toured the Dominion on behalf of the scheme as applicable to this country. He finally addressed a joint meeting of members of the Government Health Department, the hospital boards, and the B.M.A., and advised a reduction in the number of the hospital boards, the establishment of a non-political Board of Control of hospitals, the encouragement of voluntary subscribers with representation on the management, and the construction of hospital accommodation for all classes of patients, according to their ability to pay.

Given the money, a voluntary hospital could establish such a scheme to-morrow, if it chose; but the difficulties in adopting the policy in municipal hospitals are evident when details are discussed. The ratepayers, not the doctors, contend that any ratepayer has a right to enter his own hospital, and that all must enter on equal terms; the hospital boards decline to incur expense in building wards for the convenience of doctors in their private practice, and the cry is raised of "class distinction" (which applies equally to the provision of first- and second-class carriages on the Government railways). The Minister of Health has spoken unfavourably of the scheme on at least two public occasions, on the ground that it would lead to undue control of the hospitals by the medical profession; and perhaps he voices the public opinion. The doctor, on the other hand, appears to have determined that he will not act for the existing hospital patients except in an honorary capacity—that is, he will not become a paid servant of a hospital board. He declines to treat persons in an honorary capacity who can pay his fees, and he finds and fears an increasing tendency for such persons to enter public hospitals on account of their accessory advantages. He sees a solution for all these difficulties in wards for paying patients, but he is not at present very clear as to how they are to be provided.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following table gives some of the health statistics for 1925 of a group of districts. We comment below on the reports recently issued from the medical officers of health.

Name of district.	Estimated mid-year population (R.-G.).	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.	
			All causes.	Tuberculosis.	Cancer.	Resp. diseases with influenza.	Heart disease.	Infant mortality.	Maternal mort. from childbirth.
Southport C.B. .	74,260	13·1	12·6	0·73	1·46	2·3	1·5	61	2·0
Watford B. ..	48,990	17·2	9·8	1·10	1·42	1·7	1·1	47	3·5
Woking U.D. ..	26,410	15·5	8·8	0·98	1·55	0·9	1·7	21	2·4
Guildford B. ..	26,070	17·4	11·0	0·69	1·46	1·8	1·7	45	9·0
Guildford R.D. .	20,330	14·0	9·3	0·54	1·58	1·4	1·2	61	0·0
Thrapston R.D.	11,336	16·9	13·4	0·88	1·84	2·4	1·3	57	5·2

C.B. = County borough. B. = Borough. U.D. = Urban district. R.D. = Rural district

Southport.

Dr. G. C. Barnes describes his area as a bed of blown sand resting on peat, which, in its turn, rests on laminated blue clay. Although the lower strata are subsiding, the loss is more than made good by the sand derived from the Mersey, and land is rapidly being reclaimed on the foreshore. Thus, since 1921, 30 acres have been reclaimed and form an extension to the municipal golf links. High banks of house refuse are constructed to exclude the sea and are covered with soil and sown with grass seeds. When the banks have been formed, the area reclaimed is filled in with refuse covered with sand and sown. During 1925 630 new houses were erected. Generally speaking, the housing conditions are good, but there is still a lack of houses for manual workers and other persons with small means. The cost of labour and materials also interferes with the repairing work. The birth-rate has declined considerably during the last quinquennium. In 1921 there were 1106 births and in 1925 only 973. The percentage of deaths at various age-periods has altered. Thus the percentage of deaths under 1 year was 8·1 in 1921 and is now 6·3, while the percentage of deaths over the age of 65 has gone up from 48·8 in 1921 to 52·3 in 1925. The isolation hospital is reported to be "both obsolete and tumble-down," but nevertheless Dr. Barnes is able to give credit to the nursing staff for obtaining excellent results. A peculiar feature of the scarlet fever recently dealt with has been the number of relapses or second attacks. "The cases referred to are those in which the patient has had an unquestionable and characteristic attack of scarlet fever, often of decided severity, and in which the second attack of undoubted scarlet fever occurs during the treatment." The second attack was, as a rule, of moderate or slight severity. At the tuberculosis sanatorium trial has been made of Dr. Samuel H. Stewart's lung splint with encouraging results, and it is suggested that this method has advantages over treatment by artificial pneumothorax. Dr. Barnes again comments on the difficulty in getting in touch with cases of pulmonary tuberculosis at an early stage of the disease and supports his comments with the history of some typical cases. He concludes with a list of the early signs, which should have a good effect in bringing available resource for diagnosis into action without delay. Antenatal work makes considerable progress. Thus the births numbered 973, and 177 expectant mothers visited the antenatal clinic at the municipal maternity hospital. Dr. A. S. Garden, the obstetrician-in-charge, says the attendances at the clinic are most satisfactory.

An unusual feature of the sanitary work of Southport is the flushing of private drains at the public cost. This apparently originated in the large number of objectionable waste water-closets which needed special attention to keep them clean. The practice was discontinued in the early years of the war, but was resumed in October, 1923, and cost the local authority £1761 in 1925. Dr. Barnes thinks this public flushing of private drains may have an educative effect upon the householder. The water-supply is derived from wells over 200 feet deep, maintained by a water board which supplies Southport, Formby U.D., and West Lancashire R.D. The temporary hardness is 23·7 and the permanent hardness 11·6. Dr. Barnes describes the water as exceptionally pure. An atmospheric pollution table shows that Southport comes out well in comparison with London and industrial districts.

Watford.

Since the new Milk Act came into force the council have decided to take samples at least twice a year from every milk-supply coming into the town, and they have also appointed a veterinary inspector to examine the herds in the two cowsheds situated in the borough. The demand for designated milk is increasing. Dr. W. J. Cox reviews the housing position in Watford. In 1923 a municipal scheme for the erection of 953 houses was completed. At the beginning of 1921 the medical officer of health estimated the need for houses at 1000. At the end of 1923 there was still a waiting-list of 1000 families. Since the completion of the municipal scheme this waiting-list has gradually increased to 1650 in March, 1926. Private enterprise does not cope with the demand for working-class houses. Two municipal schemes are therefore on foot—namely, to provide 124 houses on the Harebreaks estate and 48 on the Wiggenhall estate. In addition to this 74 houses are being built on the latter estate for rehousing slum-dwellers. Progress has been made in the demolition of condemned houses, the worst slum having now been entirely demolished, 30 years after its condemnation by the medical officer of health of that time. Dr. Cox states that during the last five years

the maternity and child welfare work has been developed by the addition of a dental clinic, and the assistance of the orthopædic centre of the Red Cross Association has proved very useful, an increasing number of infant cases being referred to it every year. The mothers attending the antenatal clinic have increased from 175 in 1921 to 321 in 1925, the total births in the borough being 847 in the latter year. The infants' home at Little Nascot was originally opened as a crêche during the war. At first it was used for both ailing and normal infants. It has been found, however, that certain parents make a convenience of the home for getting rid of their children. In future, therefore, children will be returned home when their health is established and the home will be made available for ailing children in districts outside Watford. The school report shows that as a rule parents in Watford respond promptly by obtaining treatment for their children when defects are pointed out. The dental scheme in the schools has made steady and satisfactory progress during the past five years.

Woking Urban District, Guildford Borough, and Guildford Rural District.

Dr. R. W. C. Pierce reports that the fever hospital at Woodbridge, Guildford, which serves his three districts, and also the borough of Godalming and the rural district of Hambledon, is inadequate. There are no small wards for complicated cases or cases requiring isolation. Before the war plans had been prepared for a new ward for diphtheria and four single-bedded wards, but the scheme was abandoned both then and after the war for reasons of economy. Dr. Pierce is convinced of the utility of an isolation hospital for diphtheria, but is impressed with the objections to so-called hospital isolation for scarlet fever. He is of opinion that cases indistinguishable from scarlet fever, but which are not true scarlet fever, are frequently admitted to hospital and there develop true scarlet fever. He thinks, also, that mild cases of true scarlet fever are apt to become more severe as the result of admission to a general fever ward. He concludes, therefore, that the only really satisfactory hospital method of treating scarlet fever would be to isolate each case in a separate cubicle. During 1925 the average detention of diphtheria patients in Woodbridge hospital was 49 days and of scarlet fever patients 60 days. In each case the stay might be shortened if unhealthy tonsils were removed, but in diphtheria convalescence the anæsthetic has its dangers and in scarlet fever operation could not safely be undertaken until all inflammation of the throat as resulting from the fever had subsided. There is still a great scarcity of cottages in the Woking district, and Dr. Pierce favours the erection of steel cottages of the Weir or Atholl type. In the Woking district many of the houses have large back additions which interfere with the lighting of the living-room, and a by-law is needed limiting the extent of this back addition. In Guildford borough 406 municipal cottages have been built since the war, and the arrears of rent are strikingly small. Dr. Pierce has reason to believe, however, that the tenants are only able to pay the high rents by stinting themselves of food and necessaries. The need for cheaper dwellings is imperative and the 22 cottage flats erected last year were enormously appreciated. Dr. Pierce also thinks that the small percentage of rents in arrears indicates that ability to pay the rent is the chief qualification considered in the selection of tenants, rather than need of accommodation. In Guildford rural district the council formulated a scheme in 1919 for the erection of 256 cottages; 195 of these have been erected, but there is still a scarcity, made worse by the acquisition of existing cottages by week-end visitors. In one parish the number of cottages built in recent years is actually less than the number converted into "week-end cottages." In all these districts considerable attention is being given to the improvement of the milk-supply.

Thrapston Rural District.

A quarter of Dr. A. McInnes's district, population 826, is in Huntingdonshire, the rest in Northamptonshire. Two cases of encephalitis lethargica were notified. The one, a man of 29, died from septic trouble and the diagnosis was doubtful. The other, a boy of 12, recovered, and it is stated by his schoolmaster that since restarting school this boy, previously rather dull mentally, has developed quite a capable mathematical brain.

The one case of puerperal fever notified ended fatally; the patient was confined in a low-lying, damp house with a cattle-yard behind it. During the last nine or ten years impetigo contagiosa has been common among the children living in the immediate neighbourhood. The public water-supply at Woodford was found to be polluted with *B. coli*. Investigations showed that the well was faultily constructed, permitting easy contamination by surface water. The mouth of the well was raised and the well was given an impervious surround down to the clay. Dr. McInnes mentions that there is much room for improvement in the district as regards cleanliness in milk production.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED JUNE 19TH, 1926.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 156 (last week 201); scarlet fever, 1412; diphtheria, 803; enteric fever, 53; pneumonia, 572; puerperal fever, 50; cerebro-spinal fever, 5; acute poliomyelitis, 9; encephalitis lethargica, 42; continued fever, 1; dysentery, 12; ophthalmia neonatorum, 107. There were no cases of cholera, plague, or typhus fever notified during the week.

Deaths.—In the aggregate of great towns, including London, there were 2 (0) deaths from enteric fever, 37 (5) from measles, 4 (4) from scarlet fever, 21 (1) from whooping-cough, 24 (6) from diphtheria, 41 (11) from diarrhœa and enteritis under two years of age, and 38 (4) from influenza. The figures in parentheses are those for London itself.

THE DREADNOUGHT HOSPITAL FOR SEAMEN.—On June 23rd, at Greenwich, Lord Devonport laid the foundation-stone of a new building to be a nurses' home for the hospital, with accommodation also for massage, X ray, and ultra-violet light treatment. This, Captain Sir Arthur Clarke, chairman of the board, explained, had only become possible since Lord Devonport, when Food Controller, had determined to start a fund to commemorate the work done by seamen for the country in the war, and had raised £250,000, one-third for endowment, while the Admiralty had let the hospital have the ground on the Greenwich Hospital School side of the road on very favourable terms.

INTERNATIONAL EXHIBITION IN BUDAPEST.—An exhibition was opened in Budapest early in June which will continue until the end of August. Its promoters have tried to cover the whole realm of hygiene and public health and there are sections dealing with every branch of domestic and sanitary science. In addition, the exhibition contains many diversions, and the visitor may enjoy the amenities of one of the most beautiful cities in Europe. A booklet has been issued entitled "Three Days in Budapest," which can be purchased from all travel bureaus for 1 million Hungarian crowns (about £3 sterling) and which contains coupons entitling the holder to a Hungarian visa at half price, to reduced fares on the Hungarian railways, to hotel accommodation in Budapest for three days, and to many other facilities.

DONATIONS AND BEQUESTS.—Mr. Isidore Silverberg, of Sefton Park, Liverpool, besides bequests to Jewish and other institutions, left £1200 to the Hospital for Consumption and Diseases of the Chest, as to £1000 to endow two Silverberg beds either at Mount Pleasant or at Delamere, and the income from £200 to provide the usual Christmas tree; £1000 to the Liverpool University as an Isidore Memorial Fund; £300 to the Norwood Jews' Hospital and Orphan Asylum; £500 to the National Council for Combating Venereal Diseases; and £250 to the Queen Victoria District Nursing Association.—Mr. Henry Johnson Mason, of Halesworth, Suffolk, formerly of Bingley, Yorks, left £1000 to Dr. Maurice Alan Cassidy, of Montagu-square, W., "in recognition of his kindly and unremitting attention."—The late Mr. John Stuart, C.B.E., of North-side, Clapham Common, S.W., and of Stonehurst, Ardingly, Sussex, left by will £1000 each to the Royal Infirmary, Edinburgh, and the King Edward's Hospital Fund.

Correspondence.

"Audi alteram partem."

NON-SPECIFIC PROTEIN INJECTIONS IN CHRONIC ARTHRITIS.

To the Editor of THE LANCET.

SIR,—Dr. Yeoman's article in your issue of June 26th is worthy of most careful study and he is to be congratulated upon the success which has attended his use of injections of foreign proteins.

Two sentences in his communication call for comment. "Antibodies which have disappeared after an infection return to the serum after any procedure that increased the body temperature." "Perspiration is an important factor, for the patients who derive the greatest benefit have the most profuse perspiration." From these two observations it would appear possible that the good results which this mode of treatment can produce are dependent mainly, if not entirely, upon the two factors of fever and sweating.

For many years Wilde has claimed that rheumatic affections can be cured by the simultaneous production of artificial fever and sweating. Those who have studied his work and treated patients in accordance with this view can claim startlingly good results. For the production of fever and sweating there is no need to subject a patient to the pain and general disturbance that follow intravenous injections of vaccines. Equally good results follow the enclosure of a patient in a warm moist atmosphere for half an hour once or twice a day, or the use of hot packs. Such measures produce a rise of temperature of 3° to 4°, profuse acid sweating, and a speedy relief of pain and disabilities such as Dr. Yeoman describes. They entail neither admission to hospital nor confinement to bed and can be carried out at home without undue disturbance of daily routine. They may be slower in their action than intravenous injections of foreign matter but are none the less certain of success if properly carried out. Such treatment is not a cure-all; mechanical disabilities of joints may necessitate local mechanical measures in addition, septic foci must be dealt with if they are delaying cure and perpetuating disease, and in some cases specific vaccines may be indicated—e.g., in gonorrhœal rheumatism—but the main elements of treatment are to make the patient feverish and to make him sweat.

I am, Sir, yours faithfully,

June 28th, 1926. C. E. SUNDELL.

TUBERCLE BACILLI IN TUBERCULOUS PUS.

To the Editor of THE LANCET.

SIR,—I should like to record a few critical remarks on a paper with the above title by Dr. A. D. Gardner, which appeared in THE LANCET of June 5th. I do so chiefly to draw attention to the grave errors into which a laboratory worker may be led by a lack of appreciation of important clinical details.

Dr. Gardner compares his finding of 90 per cent. positive results obtained by the microscopical examination of pus from lesions of bones and joints with the 50 per cent as reported by Dr. Guest and myself in a recent paper (*Journal of Hygiene*, xxv., 109). Dr. Gardner will notice that Dr. Guest and myself were very careful not to compare our results with those of any other observer, as such a comparison, without carefully taking into account the clinical condition of the patient and the treatment adopted, would be inaccurate.

He, however, contents himself with a rough division of his cases into those with, and those without, secondary acute inflammation. The finding of tubercle bacilli in pus from such morbid lesions and their number depends on various factors, and I trust I shall be pardoned if I mention a few.

(*a*) Condition of patient—whether improving or getting worse.

(*b*) Type of lesion:—

(1) If there is acute abscess formation or an acute exacerbation of a chronic condition, tubercle bacilli can be demonstrated in 100 per cent. of cases.

(2) On the contrary, in a chronic case, especially if it has been frequently aspirated and is advancing towards cure, the specimen is usually serous in character, and tubercle bacilli are difficult to find.

(3) Again, in cases of secondary infection, especially if the discharge is profuse, tubercle bacilli are difficult to demonstrate by microscopical examination.

(*c*) Method of treatment:—

(1) How frequently aspiration has been performed, and at what intervals.

(2) Whether any chemical—e.g., magnesium sulphate solution, iodoform emulsion, &c.—has been introduced into the abscess cavity on a previous occasion.

(3) Heliotherapy has also been mentioned as a possible factor, but of this I have no personal experience.

From the above it will be obvious that the comparison of laboratory findings, without taking into account the other important clinical factors, is bound to be unreliable.

I shall now turn to another source of error. Dr. Gardner has evidently worked with either caseous or fluid pus. If he reads the paper by Dr. Guest and myself more carefully, he will note that the material examined was not classed as pus, but as "pathological material." For example, one specimen was from a case of tuberculous dactylitis without abscess formation, and some of the others consisted of only granulation tissue. In such conditions it is well known that the finding of tubercle bacilli in direct film preparations is much more difficult than in pus, and here again the comparison goes astray. Regarding Prof. Dreyer's method of counter-staining, I have compared this method with others, and in my hands, though quite useful, it showed no superiority over other reliable methods if the latter were properly applied. The method of test was to make an even film on a microscope slide, and after staining with carbol fuchsin, and decolorising with acid and alcohol, the slide was cut with a diamond. One half was stained by one and the remaining half by the other of the two counter-stains to be tested. In this way a true comparison could be made.

To conclude in a less critical tone, I am glad to note that Dr. Gardner has remarked on the importance of the presence of various granules in tuberculous pus. He says: "Tuberculous pus often, perhaps always, contains in addition to tubercle bacilli, granules of various size. . . ." With this statement I heartily concur, and would even go further and leave out "in addition to tubercle bacilli" as not being entirely essential.—I am, Sir, yours faithfully,

J. W. EDINGTON.

Sheffield University, June 22nd, 1926.

SURGICAL TREATMENT OF GASTRIC AND DUODENAL ULCERS.

To the Editor of THE LANCET.

SIR,—Recent correspondence in your journal with reference to the surgical treatment of gastric and duodenal ulcers is both timely and important. I note that Mr. Seton Pringle, in his able article on hour-glass stomach, has come to the conclusion that partial gastrectomy is the treatment of choice. With him I am in accord entirely, and my experience goes to prove that the most satisfactory procedure is a two-stage operation. Most of these patients are emaciated and for this reason I perform a posterior gastro-enterostomy first of all, anastomosing the jejunum to the proximal sac of the hour-glass. The immediate effect is improvement and a gain in weight. I then perform the second stage of the operation, which consists in excision of the ulcer and distal sac of the hour-glass. At the second operation a most striking finding has been a diminution in size and a cessation of activity in the ulcer, both points of

importance in that they render the second operation an easier and safer enterprise. I have performed this operation now on several patients and have not had a moment's anxiety in the immediate post-operative events or a single subsequent regret. Dr. Arthur F. Hurst speaks of successes over years from the operation of gastro-gastrostomy. I have performed this operation, but my results have not been comparable to those obtained by a two-stage gastrectomy. I feel sure that the surgical principle underlying such treatment should be "operate upon a quiescent ulcer rather than upon an active one," and such a principle is achieved by a preliminary gastro-enterostomy.

We owe a debt of gratitude to Mr. R. Leonard Ley, of Great Yarmouth, for his very true remarks upon perforating gastric ulcers, and I presume he includes perforating duodenal ulcers. In an industrial city like Bradford we get a very great number to deal with in the course of a year. Out of 150 cases operated upon my mortality amounts to 8 per cent. I confine myself to closing and inverting the perforation, inserting a drain for 48 hours to the bottom of the right kidney pouch, and nothing further; the operation itself taking round about 12 to 15 minutes. In only nine cases have I had to perform a subsequent gastro-enterostomy. I have been kept informed about the majority of these cases and the ultimate result has been a cure, both clinically and by X ray examination. I quite agree with Mr. Ley that gastro-enterostomy at the time of closing the perforation is both unnecessary and unjustifiable. I only wish we could hear more from general practitioners like Mr. Ley, who are doing this work and who "have to live with their patients afterwards." I for one should like to congratulate him upon a very valuable contribution to gastric surgery.—I am, Sir, yours faithfully,

BASIL HUGHES, D.S.O., F.R.C.S., &c.,
Surgeon, Bradford Municipal General Hospital; Hon. Surgeon, Bradford Children's Hospital; Hon. Assist. Surgeon, Bradford Royal Infirmary.
Bradford Moor, Bradford, June 21st, 1926.

ALTERATION OF VISION DUE TO BASAL FRACTURE OF SKULL.

To the Editor of THE LANCET.

SIR,—A quarryman, aged 24, fell, two years ago, a distance of 50 feet down a shaft, coming down on his buttocks. There were signs of basal fracture, slight hæmorrhages over the mastoid processes, slight unconsciousness, some hæmorrhage from the ears. He speedily recovered. His vision had been normal before the accident. It has become slightly myopic and indistinct. I find he can read 6/6 with a minus lens 0·5, cyl. with the axes vertical both eyes. Is there any reference in literature to alterations of vision due to basal skull injury?

I am, Sir, yours faithfully,

Corris, Merioneth, June 22nd. E. C. B. IBOTSON.

THE DANGER OF AN EXTERNAL DRUG COMBINING WITH AN INTERNAL DRUG.

To the Editor of THE LANCET.

SIR,—On reading Dr. T. M. Allison's letter in THE LANCET of June 26th I was reminded of a very disturbing case I had several years ago. A patient came to consult me for a phlyctenular ulcer of the eye as his own medical adviser was out of town. Not knowing he was taking pot. iodide internally, I dusted the eye with calomel, and the result was a very acute inflammation due, no doubt, to the formation of iodide of mercury. I may add that though the inflammation was very severe for a few days it cleared up completely and left no permanent ill-results; in fact; recollection suggests that the phlyctenular ulcer healed up very rapidly.

I am, Sir, yours faithfully,

J. JOHNSTONE REDMOND.

Chelsea, S.W., June 28th, 1926.

YAWS AND SYPHILIS IN TROPICAL AFRICA:

MASS TREATMENT WITH BISMUTH-ARSENIC COMPOUNDS.

To the Editor of THE LANCET.

SIR,—In THE LANCET of Jan. 30th, 1926, Levaditi reported favourably on a new compound—namely, basic acetyoxyamino-phenylarsenate of bismuth, produced by the reaction between a soluble salt of bismuth and stovarsol. About 18 months ago it occurred to me that a mixture of bismuth sodium tartrate and soamin, para-aminophenylarsenate of sodium, might produce a better therapeutic effect than bismuth sodium tartrate by itself, the latter now placed on the market by Howard and Sons as "sobita," which we have been using for large numbers of yaws and syphilis with good results. Over 113,000 cases of yaws, and approximately 22,000 of syphilis have now been treated, and somewhat larger numbers of yaws have also been treated, with a similar preparation, in a neighbouring colony—and I estimate that there are at least nine times the total shown for yaws still to be dealt with.

I did not, at the time mentioned, realise that in mixing "soamin" and bismuth sodium tartrate a reaction might result, but since reading Levaditi's article and attempting in a crude way to produce a reaction between bismuth sodium tartrate and stovarsol, I find that on boiling together not too dilute solutions of soamin and bismuth sodium tartrate prepared separately and then brought together, a reaction resulting in a similar fine suspension takes place on heating, which suspension deposits slowly leaving a clear supernatant fluid. An hypodermic injection administered to myself of the whole preparation produced by 3 gr. each of bismuth and soamin in 2 c.cm. of water resulted in tenderness, but less swelling and discomfort than is incident upon the introduction into the tissues of the soluble bismuth salt alone. Sequent on this a case of yaws treated by me with this preparation, by intramuscular injection, responded rapidly. I thereupon instructed Dr. J. G. McNaughton, our venereal diseases officer, and Dr. Armstrong, attached to the Native Hospital, Dar es Salaam, to give this preparation a trial, and an extract from Dr. McNaughton's report is given below. Dr. McNaughton's clinic is a travelling clinic, and the extract is from his report for April, 1926:—

> You will observe that I have treated patients with: yaws 1158, syphilis 538, and other diseases 625. *Yaws.* There were about an equal number of children and adults. Several showed an almost rupial crust over the yaws, and many had tertiary manifestations in the soles of the feet and palms of the hands. The injection given was a combination of bismuth sodium tartrate (gr. 3) and soamin (gr. 2), as you recommended, in 1 c.cm. of water, administered every second day. Cases of yaws almost invariably cleared up in six days, and were so nearly healed on the fifth day (even the most severe cases) that the third injection was not given. *Syphilis.* No primary or secondary case was seen. All were either tertiary or congenital; about 50 per cent. of each. About 10 per cent. of the tertiary cases were unable to move one or more of the limbs, on account of ankylosed joints, and I have seldom seen, even in this country, so severely ulcerated cases. These patients all received the combination of the two drugs by injection, and within 12 days—i.e., after six injections—quite 75 per cent. were completely healed. I have never seen such rapid improvement, even after bismuth injections, so that I am inclined to conclude that the addition of the soamin has accelerated the healing. In the 1696 patients who received two or more injections, I saw only 10 cases of mild stomatitis. It may not be a case of post hoc, propter hoc, but, in my previous experience of treatment by the bismuth salt, the cases of stomatitis have been greater in number and more severe.
>
> I have seen here five female patients who were treated at the Sewa Hadji Hospital 18 or 24 months ago. All received injections, 6, 8, or 10 in number. All these people had had extensive ulceration of the limbs. To-day they appear in perfect health. There is no sign of ulcer or sore and their general condition appears to be much better than that of their neighbours. In this connexion I noticed that after 1 or 2 injections the very severe cases of syphilis had a different look. They were brighter,

their skin and eyes seemed healthier, and I was struck by their apparently altered outlook on life.

Dr. Armstrong treated 15 cases and reported similar results, but emphasised the fact that he did not see any stomatitis in his patients—they were, however, too few. The question of treatment to us in a territory of 365,000 square miles and a scattered population of approximately 6,000,000, a large percentage of which is afflicted with yaws, and to a lesser extent syphilis, is of vital importance. We cannot afford expensive drugs, nor do we think that for mass treatment with the object of reducing as rapidly as possible the enormous degree of infectivity, the immediate amelioration of the physical condition of the sufferers, and the safeguarding of the coming generation, it is necessary, or yet feasible, to employ them. To attempt permanent cure with the exhibition of the salvarsan group is absolutely out of the question, and, apart from expense, it would be impossible to secure anything approaching regular attendance amongst an African population.

In the Dutch West Indies, Dr. Winckel reports the use of 400 kg. of neosalvarsan, costing some £250,000, for the treatment of yaws, and his opinion is that an average of four injections were essential. I have stressed these points to show that a few injections of neosalvarsan are no more valuable and do not attain any better clinical results than the use of bismuth, and that if one or other is to be used for yaws or syphilis, to achieve our local purposes relating to mass treatment, then neosalvarsan should not be used except in special cases. Regarding more particularly the treatment of syphilis with bismuth sodium tartrate the reports as a whole are satisfactory but are not uniform. Its resistance as compared with yaws is greater in ratio of about 4:1—namely, it requires about three to four times the quantity of bismuth for a so-called cure—that is, the entire absence of active signs and the general recovery in health of the patient. Dr. L. W. Harrison admits the great difficulty of converting a positive into a negative serum reaction. One of the types of cases referred to, early secondary, requires treatment under close supervision for some three years, during which time 16 g. of neosalvarsan is used costing about £8 per head, and, be it noted, with no claim to negative reaction. We, on the other hand, can treat approximately 500 cases of yaws or 125 of syphilis, for 16s.—the cost of staff, organisation, &c., is, of course, equal in either case.

We have been using the soluble salts of bismuth in this Territory since early in 1922, shortly after Roux had stated that bismuth was of value in syphilis, before it was generally adopted by anybody, and the methods we employed at that time have resulted in about 300,000 cases of yaws being treated in Kenya, the Sudan, Zanzibar, Fiji, and this Territory. I wish therefore to indicate to those interested, in view of our four years' experience and the mass of disease still remaining to be dealt with, that the quickest, and therefore the least expensive, effective measure should be taken, so far as the indigenous population of tropical Africa is concerned; otherwise we are wasting time in handling a few thousands in a futile attempt at permanent cure whilst hundreds of thousands requiring immediate relief are left untouched. I hope that some of your readers, who have the welfare of the native at heart, and are in a position to test the compound produced by the interaction of bismuth sodium tartrate and soamin, may give it a trial in syphilis and report as to its relative efficacy as compared with Levaditi's preparation "bistovol." The former can be prepared very simply at a cost of less than a penny a dose, whereas bistovol will probably be at a price which for us will be prohibitive. Bismuth by itself is good enough for yaws, but it would appear that the compound of bismuth and soamin is much the better for syphilis—the low percentage and mild degree of stomatitis is also a decided advantage in its favour.

I am, Sir, yours faithfully,

J. O. SHIRCORE, M.B., M.R.C.P. Edin.,
Director of Medical and Sanitary Services,
Tanganyika Territory.

May 12th, 1926.

Parliamentary Intelligence.

HOUSE OF LORDS.

TUESDAY, JUNE 29TH.

University of London Bill.

THE University of London Bill was read a second time.

HOUSE OF COMMONS.

THURSDAY, JUNE 24TH.

Milk for Mothers in Mining Areas.

Dr. SALTER asked the Minister of Health what additional provision was being made, as a consequence of the miners' dispute, for the supply of milk to nursing and expectant mothers and to young children through the county councils or local authorities.—Mr. NEVILLE CHAMBERLAIN replied: I have no information as to any special action taken in this matter by local authorities. On the question of policy, I may refer the hon. Member to the reply which I gave on this subject on the 10th instant.

Neurasthenic Patient's Pension.

Dr. SALTER asked the Minister of Pensions if he was aware that ex-stoker William Ewart Gladstone Day, No. K.21,477, late Royal Navy, was granted a final award of only 1·5 per cent. for 35 weeks in April, 1922, while still suffering from neurasthenia and deafness due to an explosion on H.M.S. *Bulwark* in November, 1914, when he was one of only 16 survivors; and that this pension was increased to 20*s.* 7*d.* per week on Dec. 31st, 1925, after prolonged correspondence with his department when this man's neurasthenia was assessed at 20 per cent.; why the pension was reduced to 16*s.* on March 2nd, 1926, when his neurasthenia was still assessed at 20 per cent. and his ear condition remained unchanged; and why this pension has not been made retrospective to June 2nd, 1923, more than a year after his final award of 1·5 per cent., when he was admitted to hospital and operated on for acute mastoid disease.—Major G. C. TRYON replied: The hon. Member has been misinformed. The award made in 1922 to which he refers was in respect of deafness only. As regards the award for neurasthenia this was originally at the rate of 30 per cent. and was reduced to 20 per cent. by the medical board of Jan. 22nd, 1926. Mr. Day did not make a claim on the Ministry in proper form in respect of neurasthenia until February, 1925, but the award in respect of that disability was made from the date of a letter on his behalf which has been accepted as constituting an earlier claim. The award in respect of deafness in replacement of the award made in 1922 runs from the date of the medical examination by a Ministry doctor which definitely proved the need for the amendment of the 1922 award. I can find no ground for making either award from an earlier date.

Death in Bedford Prison.

Mr. PETHICK-LAWRENCE asked the Secretary of State for the Home Department (1) whether he was now in a position to make a statement with regard to the circumstances attending the death of Mr. Reginald Russell in Bedford prison on May 23rd, and (2) what arrangements were made for removal to hospital of unconvicted prisoners who were seriously ill; what regulations existed for securing that the relatives were informed of serious illness; and whether they were complied with in the present instance.—Sir W. JOYNSON-HICKS replied: I regret to say that the report discloses errors of judgment and failure to comply with the regulations on the part of certain officials of the prison. The prisoner complained of illness on April 27th and May 10th, and on May 11th took to his bed until his death on May 23rd. His disease was wrongly diagnosed and he did not receive either the medical or nursing treatment which, in my opinion, he should have had; nor was he removed to hospital. The prisoner was suffering from kidney disease, and it may be that his condition was such that his life could not in any event have been saved, but that would not, of course, excuse in any way the mistakes and irregularities that were committed. The facts of this case, deplorable as they are, do not suggest that the regulations with regard to the treatment of illness in prison are defective, but, as in all human institutions, mistakes cannot always be avoided. The Secretary of State is ultimately responsible for the conduct of prison officials, and I have decided to take disciplinary measures in regard to the officers concerned. I am not in a position to give my final decision in regard to these to-day, but if the hon. gentleman will put down a question for to-day week, I hope to have completed my decisions.

Septicæmia following Childbirth.

Colonel DAY asked the Minister of Health if his attention had been drawn to the number of deaths due to puerperal

septicæmia, following childbirth, in the Kingston area: and, in view of the fact that many of these cases had been connected with one nursing home in particular, would he cause a full inquiry to be made as to the effectiveness of the existing county council regulations.—Mr. NEVILLE CHAMBERLAIN replied: The answer to the first part of the question is in the affirmative. As regards the second part an inquiry has already been made into these cases by one of the medical officers of my department, and her report is now under consideration.

National Insurance Statistics.

Sir NICHOLAS GRATTAN DOYLE asked the Minister of Health, with reference to National Health Insurance, the total of the accumulated funds at Dec. 31st, 1925; the total payments made during the year ended Dec. 31st, 1925, by insured persons, employers, and the State respectively; the number of insured persons, male and female, separately; the total benefits paid during the year ended Dec. 31st, 1925, for sickness benefit, disablement benefit, maternity benefit, medical benefit, and additional benefits, respectively; the total amount allocated to approved societies for additional benefits; the total amount retained by the State, which is regarded by the Act as surplus; the number of societies which have disposable surplus for additional benefits; and the number of societies in deficiency.—Mr. NEVILLE CHAMBERLAIN replied: The particulars asked for with reference to National Health Insurance so far as available are given for England and Wales in the following statement:—

	£
Total of the accumulated funds at Dec. 31st, 1925	113,000,000
Total payments made during the year ended Dec. 31st, 1925—	
by insured persons	11,970,000
employers	12,800,000
the State	7,220,000
Number of insured persons—	
Male	9,395,000
Female	4,550,000
Total benefits paid during the year ended Dec. 31st, 1925—	
for sickness benefit	9,335,000
disablement benefit	4,514,000
maternity benefit	1,489,000
medical benefit	8,449,000
additional benefits not included above*	761,000
The total amount allocated for distribution by approved societies by way of additional benefits of every description in the year 1925 may be estimated approximately at	2,500,000
The number of units (i.e., centralised approved societies and branches of approved societies with branches) operating in England and Wales at the first valuation which had disposable surplus for additional benefits was	7,775
The number of societies and branches in deficiency was	377

*Additional benefits which take the form of increases of ordinary cash benefits (sickness, disablement, and maternity) are included in the figures for those benefits and cannot be separately stated. Payments in respect of additional benefits which do not take that form are separately shown.

The inquiry as to the total amount retained by the State which is regarded by the Act as surplus is not understood. The whole of the assets of a society consisting of—

(1) Reserve values credited under Sections 66 and 69 of the Act;
(2) Sums standing in the "investment account" under Section 70;
(3) Sums standing to the credit of the society in the National Health Insurance Fund other than in "investment account";
(4) Sums invested by the society under Section 71; and
(5) Cash in the hands of the society,

are brought into its valuation balance-sheet for the purpose of the periodical valuation under Section 74, by which alone the existence of, or the amount of, a surplus can be ascertained.

The Government Actuary is preparing a report on the second valuation of the assets and liabilities of approved societies, and hopes to issue it in the autumn.

Diabetes Patient's Treatment in Prison.

Mr. PURCELL asked the Secretary of State for the Home Department whether his attention had been drawn to the case of Mr. John Forshaw, 4, Peacock-street, Salford, who, after his house was raided by the police on May 14th, was taken to the Salford Town Hall police-station; whether he was aware that he informed the officers that he was suffering from diabetes and asked to see a doctor; that this request was refused, as was also a request for the supply of blankets and that the windows might be closed, the only protection he had during the night being the coat of a man in the same cell who put his coat over Mr. Forshaw who was obviously ill; and whether, seeing that after conviction the next day Mr. Forshaw was removed to Strangeways Hospital and died on June 9th as the result of bronchitis and pneumonia contracted in the police cell, he would have a public inquiry made into this treatment given to a man prior to trial.—Sir W. JOYNSON-HICKS replied: Forshaw was in police custody from May 14th to 17th and was not treated as an invalid and made no application to be treated as such; on reception into prison on the 17th he was admitted into the prison hospital until the 20th when he was released on bail in view of his appeal to Quarter Sessions. At that time there were no signs of illness other than diabetes, from which he had been suffering for four years. On May 21st he called on the police and expressed satisfaction with his treatment during detention both in police custody and in prison. I understand that he fell ill on June 5th, 16 days after his release from prison, and on the facts before me no connexion is shown between his treatment while in custody and his death from bronchitis and pneumonia on June 9th.

Problems of Tropical Diseases.

Mr. HERBERT WILLIAMS asked the Secretary of State for the Colonies whether any system existed for the exchange of knowledge on the problems of tropical diseases of man, animal, and plant between his department and the corresponding departments of other countries with tropical possessions.—Mr. AMERY replied: The Imperial Bureau of Entomology, the Imperial Bureau of Mycology, and the Bureau of Hygiene and Tropical Diseases constantly receive information of the nature indicated in my hon. friend's question from all parts of the Empire and foreign territories. This information is summarised in the periodical monthly and quarterly reviews which are published by these bureaus and distributed to subscribers, including the Governments of the oversea dependencies. I should also refer in connexion with human tropical disease to the valuable work of the health organisation of the League of Nations, through which knowledge of the progress made in that direction is widely distributed between the different Governments represented in the organisation.

Mr. WILLIAMS: Is there any link with the Dutch Government in this matter?

Mr. AMERY: I think so, both through the League of Nations and the use made of the excellent publication issued by their department in Java.

Protection of Children in India.

Mr. JOHNSTON asked the Under Secretary of State for India whether any legislation had been introduced by the Government of India to protect children from maltreatment and exploitation by professional beggars, agents of brothels, and, if so, when.—Earl WINTERTON replied: This matter is now in the main one for the provincial governments and legislatures to deal with. Acts for the protection of children and young persons and for the trial and punishment of youthful offenders were passed in Madras, Bengal, and Bombay in 1920, 1922, and 1924 respectively. Children are protected from the agents of brothels by the Indian Penal Code, which applies throughout India, and the provisions of which, in this respect, have recently been made more stringent.

Artificial Sunlight Treatment.

Captain FRASER asked the Minister of Health if he would give the names of any metropolitan boroughs in which artificial sunlight treatment had been introduced in a maternity and child welfare centre or centres; and what contribution, if any, his department had made towards the cost of artificial sunlight equipment and or of the first year's running expenses in connexion with this treatment.—Sir KINGSLEY WOOD (Parliamentary Secretary to the Ministry of Health) replied: According to the information in the possession of my right hon. friend's department, provision has been made for artificial light treatment at, or in connexion with, maternity and child welfare centres in the following metropolitan boroughs: Bethnal Green, Deptford, Greenwich, Hackney, Islington, Kensington, Poplar, St. Marylebone, St. Pancras, Shoreditch, Southwark, Stepney, and Westminster. In those cases in which the prior approval of my right hon. friend's department was obtained to the arrangements and a contribution is desired towards the cost, the usual grant of 50 per cent. is being paid towards the net cost of the installation and the first year's running expenses.

MONDAY, JUNE 28TH.

Pit-head Baths.

Mr. WILFRID PALING asked the Secretary for Mines how many coal-mines in Great Britain had established pit-head baths, and how many persons such baths provided for.—Colonel LANE-FOX replied: At Dec. 31st, 1925, pit-head baths on the shower bath principle had been installed for general use at 23 coal-mines in Great Britain and were in course of installation at nine others. The total number of shower bath cubicles comprised in these installations was 1729, which, it may be assumed, would provide accommodation for about 17,000 to 20,000 men per day. These figures

do not include slipper baths, plunge baths, swimming baths, or any bathing accommodation reserved for the use of officials only.

Factory Legislation and Health.

Sir WILFRED SUGDEN asked the Prime Minister if he could yet give a date when legislation upon the factory conditions of employment would be introduced; and if he would give opportunities for tested and considered practical suggestions prepared by the various industrial research associations to be included in such legislation if it be found neither to handicap nor increase cost of production, but to give healthier conditions of labour for employees.—Captain HACKING (Under Secretary for Home Affairs) replied: My right hon. friend the Home Secretary has already promised to introduce the Factory Bill this session for purposes of information and consultation, and he hopes to introduce the Bill next month. He will certainly give careful and sympathetic consideration to any such suggestions as are referred to in the question.

Female Nurses and Insane Male Patients.

Mr. CHARLES EDWARDS asked the Minister of Health whether he was aware that at the Hellingly Asylum the East Sussex County Council employed female nurses in attendance on insane male patients; and whether, in view of the moral and physical dangers thus involved, he would take steps to prevent this practice.—Mr. NEVILLE CHAMBERLAIN replied: The answer to the first part of the question is in the affirmative. I am unable to accept the assumption upon which the second part of the question is based. Medical superintendents who have had experience of the practice of nursing male patients by women nurses are practically unanimous in thinking that it is desirable in certain types of cases. I am advised that there are certain classes of patients who can be nursed by women nurses with great advantage to the patients and without risk to the nurses. I do not, therefore, propose to take action in the direction suggested by the hon. Member.

New Dentists Bill.

Mr. A. ALEXANDER presented a Bill to amend the Dentists Act, 1921, which was read a first time.

TUESDAY, JUNE 29TH.

Disinfectants on Merchant Vessels.

Mr. CLUSE asked the President of the Board of Trade if he was aware that his department still approved for use on board ship chemical disinfectants which had been disapproved of for use on His Majesty's naval ships and shore establishments; and if, in view of the necessity for the prevention of the spread of infection on passenger and emigrant ships, he would consider revising the lists in consultation with the Admiralty and the Ministry of Health.—Sir P. CUNLIFFE-LISTER replied: I am not aware that any of the disinfectants approved for use on board merchant vessels are unsuitable for the purpose. Such disinfectants are submitted for approval and are tested chemically by the Government laboratory and bacteriologically by the Lister Institute, and if they do not come up to the required standards they are not approved. The list of disinfectants so approved is continually under revision, the officers concerned having been instructed to take samples from time to time in order that a check test may be made. Where such a sample is found not to conform to the required standard the name of the disinfectant in question is removed from the approved list. I will, however, have the list examined as suggested by the hon. Member.

Venereal Disease in the Army.

Mr. BASIL PETO asked the Secretary of State for War whether the incidence of venereal disease in the Army had increased or diminished in the last three years; and what was the general view of the Army medical service as to the value of the preventive measures that had been employed—Sir L. WORTHINGTON-EVANS replied: During the last three years for which complete statistics are available, the incidence of venereal disease in the Army has decreased from 74·0 per 1000 of the strength in 1921 to 47·8 per 1000 in 1924. My medical advisers consider that this reduction is mainly due to the very effective preventive measures that have been and are still being employed. I will also refer my hon. friend to the information contained on pages 15–18 of the report on the health of the Army for 1924.

Medical Reports and Army Pensions.

Mr. HORE-BELISHA asked the Secretary of State for War what procedure was followed in the case of men invalided from His Majesty's Army who desired to question the decision of the medical officer which deprived them of pension rights; and whether the medical officer's report, which was the basis of the complaint, was referred to and taken as evidence of the correctness of that report.—Sir L. WORTHINGTON-EVANS replied: A man whose claim to disablement pension has been rejected by the Commissioners of the Royal Hospital, Chelsea, on the strength of the report of a medical board, may appeal to the Commissioners for reconsideration of his case on medical grounds and may state the grounds of his appeal. The report of the medical board is considered in conjunction with the whole of the man's medical history during his Army service. Any evidence which the man may adduce in his own interest is also considered and investigated by reference to his late commanding officer or other persons likely to be able to confirm his statement. The opinions of the consulting physician and surgeon to the Army are obtained when necessary before a decision is given.

Puerperal Septicæmia following Childbirth.

Colonel DAY asked the Minister of Health if, in view of the fact that further deaths had occurred from puerperal septicæmia following childbirth in the Kingston Nursing Association's home, which made a total of eight deaths from this cause during the last six months, and the criticisms made by the Kingston coroner on the conditions existing at this home, he was in a position to give further information to the House on the report that had been made on this home by one of his medical officers.—Sir KINGSLEY WOOD replied: My right hon. friend has now considered this report, and regrets to say that it indicates that there has been grave laxity in the administration of this home and of the district midwifery practice associated with it. He is about to address a communication to the Nursing Association dealing fully with the facts elicited by the inquiry, and he proposes to send a copy of the communication to the County Council and the Kingston Town Council. My right hon. friend will be happy also to send a copy to the hon. Member and to any other hon. Member who desires it.

The Services.

THE Orders following upon the Recommendations of the Inter-departmental Committee upon medical reform in the fighting Services were published at the end of the week. They were foreshadowed in THE LANCET last week and will give the greatest satisfaction.

In any case in which transfer from the old rates may involve loss the old rates will be maintained.

The revised rates of pay and additional pay (but not charge pay) sanctioned by the Warrant for each corps will be subject, as from July 1st, to the deduction of 5½ per cent. which was made to the old rates as from July 1st, 1924, and will further be subject to revision in respect of subsequent variation in the cost of living in the same manner and to the same extent as the rates introduced from July 1st, 1919.

The amendments take effect as from July 1st, 1926.

ROYAL NAVAL MEDICAL SERVICE.

The exact Recommendations of the Inter-departmental Committee will be available to the public next week, including new Orders in respect of the Dental and Nursing Services.

The main reforms in the Medical Service may be indicated as a result of the Recommendations. The following changes in the conditions of service of medical officers, R.N., will take effect from July 1st, 1926, or as soon afterwards as the necessary arrangements can be made.

Surgeon Captains.

The maximum number of surgeon captains will be increased from 16 to 20, two of whom will be appointed to the R.N. Hospital, Haslar, as professors of medicine and surgery respectively, on instructional duties connected with the general courses described below. The appointment of Director of Medical Studies, Naval Medical School, R.N. College, Greenwich, will in future be held by a surgeon captain, and a surgeon captain will be appointed to the R.N. Hospital, Malta, as second in charge.

Specialists' Appointments and Allowances: Charge Pay.

The number of specialist appointments will be increased from 46 to 60, and the new appointments will include specialist posts in medicine, surgery,

radiology, and hygiene. The allowance payable to holders of specialist appointments will be increased from 2*s.* 6*d.* to 5*s.* per day, as from July 1st, 1926.

The grant of charge pay will be made as from July 1st, 1926, on the following scale for medical officers in charge of various hospitals and sick quarters: Surgeon Rear Admirals and Surgeon Captains, 10*s.* a day. Surgeon Commanders, 5*s.* a day.

Professional Courses: General and Special.

Every officer below the rank of Surgeon Captain, except when he has just vacated an appointment at a home hospital or is due to take his promotion course, will be appointed, if his services can be spared, once in every four years to the R.N. Hospital, Haslar, for a course of instruction of not less than four months' duration in clinical medicine and surgery and allied subjects. At the end of the course, instead of being placed on unemployed time, the officer will be appointed for duty at one of the R.N. hospitals at Haslar, Chatham, or Plymouth unless or until he receives an appointment elsewhere.

Every officer selected to hold a specialist appointment will, provided his services can be spared, undergo a course of not less than six months' duration in his special subject at a civil hospital in London or other teaching centre, and will subsequently undergo a course of three months' duration in that subject every four years while he is employed as a specialist.

The existing senior medical officers' courses will to a large extent be superseded by these general and specialist courses which will necessitate the increase in establishments, and the new arrangements will be inaugurated as soon as possible.

Officers entering the service on or after July 1st, who have held resident appointments in civil hospitals less than one year before the date of entry, are eligible for ante-dating in certain circumstances which will be made public shortly.

Dental Officers, R.N.

The rank of Surgeon Captain (D) will be introduced and the establishment of dental officers increased to 64.

The Nursing Service.

Detailed improvements in the Nursing Service will also be published shortly.

ROYAL ARMY MEDICAL CORPS.

The rates of pay of officers will be amended as follows:—

Old Rates.	£	*s.*	*d.*
Lieut.	1	2	0
Capt.	1	7	0
Capt., after six years' commissioned service	1	8	6
Capt., after ten years' commissioned service	1	11	6
Major	1	15	0
Major, after 15 years' commissioned service	2	0	0
Lieut.-Col.	2	10	0
Lieut.-Col., after 20 years'commissioned service	2	12	6
Lieut.-Col., after 25 years'commissioned service	2	15	0
Colonel	3	5	0
Maj.-Gen.	4	15	0
Director-Gen.	£2500 a year		

New Rates.	£	*s.*	*d.*
Lieut.	1	2	0
Capt.	1	7	0
Capt., after eight years'commissioned service	1	10	0
Capt., after ten years' commissioned service	1	12	6
Major	1	17	6
Major, after 15 years' commissioned service	2	2	6
Major, after 18 years' commissioned service	2	5	0
Major, after 20 years' commissioned service	2	10	0
Lieut.-Col.	2	17	6
Lieut.-Col. after three years' service as such	3	2	6
Colonel	3	10	0
Maj.-Gen.	4	15	0
Director-Gen. (plus lieut.-gen.'s allowances)	6	0	0

An officer of the Royal Army Medical Corps employed at the War Office as Assistant Director-General, Assistant Director, or Deputy-Assistant Director-General shall receive additional pay at 5*s.* a day instead of 2*s.* 9*d.* as at present provided. The rate of additional pay for officers of the Royal Army Medical Corps appointed to act as specialists shall be increased to 5*s.* a day for all subjects.

An officer commissioned after holding a resident appointment of not less than one year in a civil hospital may be granted an antedate not exceeding one year in respect of the period spent in such an appointment provided that the interval between the termination of the hospital appointment and the date of entry into the service shall not ordinarily exceed six months. This antedate will count as commissioned service for the purpose of increments of pay, promotion, retirement, retired pay, and retiring gratuities. An officer shall be eligible to retire with a gratuity of £1000 after seven years' service instead of after eight and a half years', and an officer who, after three years' service as a major is eligible to retire with a gratuity of £1800 or after six years' service as a major with a gratuity of £2500, shall be eligible to retire with £2800 in lieu of £1800 and £3500 in lieu of £2500.

An officer serving as a medical officer, R.A.M.C., on Sept. 13th, 1919, shall be eligible on retirement as a major after 20 years' service for retired pay at a daily rate of £1 if more favourable to him than the rate assessed under the ordinary scale for medical officers. An officer who has retired as a major since Sept. 13th, 1919, after completing 20 years' service will be entitled to benefit under this provision with effect from the date of retirement.

ROYAL AIR FORCE MEDICAL SERVICE.

It has been announced from the Air Ministry that increases of pay have been granted in all ranks above flight lieutenant, promotion to which rank occurs after two years' satisfactory service. In this Service entry does not commit the officer to permanency, permanent commissions being granted by selection from officers holding a short service commission, freedom being thus allowed to the individual and to the authority. There has been an increase in the gratuities granted to short service officers passing to the Reserve both after three years' and after five years' service. Higher allowances are made to married officers and the retiring allowances to permanent officers have been increased. Larger opportunities are also being given to permanent officers to pursue professional study, while the tenure of house appointments in civil hospitals entitles the officer to antedating for promotion purposes.

ROYAL ARMY DENTAL CORPS.

The rates of pay of officers will be amended as follows:—

Old Rates.	£	*s.*	*d.*
Lieut.	1	0	0
Capt.	1	5	0
Capt., after six years' commissioned service	1	6	6
Capt., after ten years' commissioned service	1	8	6
Major	1	13	0
Major, after 15 years' commissioned service	1	18	0
Lieut.-Col.	2	7	6
Lieut.-Col., after 20 years'commissioned service	2	10	0
Lieut.-Col., after 25 years'commissioned service	2	12	6

New Rates.	£	*s.*	*d.*
Lieut.	1	0	0
Capt.	1	5	0
Capt., after eight years'commissioned service	1	8	0
Capt., after ten years' commissioned service	1	10	0
Major	1	15	0
Major, after 15 years' commissioned service	2	0	0
Major, after 18 years' commissioned service	2	2	6
Major, after 20 years' commissioned service	2	7	6
Lieut.-Col.	2	15	0
Lieut.-Col. after three years' service as such	3	0	0
Colonel	3	7	6

A captain in the Army Dental Corps will be eligible for promotion to the rank of major after 12 years' commissioned service in the corps provided that he has qualified in such manner as may be prescribed by the Army Council. The officer appointed to the charge of the Dental Laboratories, Aldershot, will

receive charge pay at the rate of 5*s.* a day if holding the rank of captain, or 2*s.* 6*d.* a day if holding the rank of major. An officer will be eligible to retire after 15 years' service as a dental officer with a gratuity of £2000 instead of £1800, and after 18 years' service with a gratuity of £3000 instead of £2500.

ROYAL ARMY VETERINARY CORPS.

The rates of pay of officers will be amended as follows :—

Old Rates.	£	*s.*	*d.*	*New Rates.*	£	*s.*	*d.*
Lieut.	1	0	0	Lieut.	1	0	0
Capt.	1	5	0	Capt.	1	5	0
Capt., after two years' service as such ..	1	7	6	Capt., after 4½ years' service as such ..	1	7	0
				Capt., after 6½ years' service as such ..	1	9	0
Major	1	13	0	Major	1	11	0
Major, after five years' service as such	1	19	0	Major, after three years' service as such	1	13	0
				Major, after six years' service as such ..	1	16	0
				Major, after eight years' service as such	1	19	0
Lieut.-Col.	2	9	0	Lieut.-Col	2	9	0
				Lieut.-Col., after three years' service as such	2	10	0
Colonel	2	15	0	Colonel	2	15	0

An officer of the Royal Army Veterinary Corps will be eligible for promotion to captain after 3½ years' service as a veterinary officer (instead of five years as at present), and to major after 12 years' service as a veterinary officer (instead of after ten years' service in the rank of captain as at present). An officer will be eligible to retire with a gratuity of £800 after seven years' service, of £1800 after 15 years' service, and £2500 after 18 years' service instead of with £1000 after ten and with less than 20 years' service.

Maj.-Gen. Sir Matthew H. G. Fell, K.C.B., C.M.G., has been appointed Director-General of the Army Medical Service in succession to the late Lt.-Gen. Sir William B. Leishman, K.C.B., K.C.M.G.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Rear-Admi. A. Maclean is placed on the Retd. List at his own request in order to facilitate the promotion of more junior officers.

Surg. Comdr. P. F. Alderson is placed on the Retd. List with the rank of Surg. Capt.

Surg. Comdrs. J. McA. Holmes to the *Pembroke* for R.N. Hospl., Chatham; and A. R. Schofield to the *Iron Duke* and as Squadron Medical Officer (on recommg.). Surg. Lts. R. R. Baker to the *Iron Duke*, on recommg., and D. H. Kernohan transferred to the permanent list.

ROYAL ARMY MEDICAL CORPS.

Capt. W. Bruce relinquishes the actg. rank of Maj.

R. L. J. Le Clezio to be temp. Lt.

ARMY RESERVE OF OFFICERS.

Lt.-Col. H. M. Nicholls, having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

TERRITORIAL ARMY.

Capt. J. T. Clark (late Scottish Rifles) to be Lt. and relinquishes the rank of Capt.

Capt. A. MacG. Duff (late R.F.A.) to be Lt. and relinquishes the rank of Capt.

Capt. F. H. White to be Maj. (Prov.).

Lt. R. Walkingshaw (late R.S. Fus.) to be Lt.

ROYAL AIR FORCE.

Flight Lt. A. E. Barr-Sim is promoted to the rank of Squadron Leader.

INDIAN MEDICAL SERVICE.

Capts. O. R. Unger, N. Briggs, and F. R. Thornton to be Majs.

The King has approved the relinquishment of his temporary commission by Capt. Shankar Ganesh Chavan.

Medical News.

UNIVERSITY OF DURHAM.—At the Third Examination for the degrees of Bachelor of Medicine and Bachelor of Surgery the undermentioned candidates satisfied the examiners in the following subjects :—

Pathology and Bacteriology; Materia Medica, Pharmacology, and Pharmacy; Public Health; Medical Jurisprudence.—Donald R. Cubey, James B. Davidson, Charles F. Ind, Robert C. Thomson, and Nora Walkinshaw.

UNIVERSITY OF EDINBURGH.—The following candidates have passed the clinical examination for the M.D. degree :—

George L. Alexander, James M. Alston, Malcolm J. Bett, William Brown, Francis R. Cripps, Mary K. Dorothy Douglas, Robert W. Eason, Frederick W. Gavin, Jessie Gordon, Ian M. D. Grieve, Arnold A. Hamilton, John W. A. Hunter, David Laing, George M. Lamb, Ian E. M'Cracken, Ogilvy J. S. Macdonald, Isabel M. MacGillivray, Mary E. M'Laren, Shena Macvicar, Alison J. Maxwell-Wood, John K. Murray, Herbert B. Porteous, Henry Selesnick, William A. Simpson, James K. Slater, Arthur F. Smith, George Somerville, Florence L. Telfer, Alexandra A. Warnock, Adam C. White, and John A. B. Young.

The following candidate has passed the examination in clinical and practical surgery for the Ch.M. degree: Alexander Lee M'Gregor.

SOCIETY OF APOTHECARIES OF LONDON.—At recent examinations the following candidates passed in the undermentioned subjects :—

Surgery.—A. M. El-Mishad, Guy's and Charing Cross Hosps.; W. E. Ivers, Manchester; L. Schapera, London Hosp.; and A. D. Shubsachs and C. H. Spencer, Manchester.

Medicine.—E. A. Stroud, Birmingham.

Forensic Medicine.—R. V. Cookes, Guy's Hosp.; J. E. Howard, St. Mary's Hosp.; D. Jacobson, St. Bart.'s Hosp.; R. Lamort, Bordeaux and St. Bart.'s Hosp. T. C. Pain, Guy's Hosp.; J. Pattis, Innsbruck and Univ. Coll. Hosp.; L. Schapera, London Hosp.; and E. A. Stroud, Birmingham.

Midwifery.—S. B. Browning, Guy's Hosp.; W. O. R. Fischer, St. Thomas's Hosp.; J. H. Gillatt, M. N. Nicolson, and M. Pettigrew, Sheffield; and M. Stinnesbeck, Freiburg and Royal Free Hosp.

The Diploma of the Society was granted to the following candidates entitling them to practise medicine, surgery, and midwifery: R. V. Cookes, W. O. R. Fischer, J. E. Howard, R. Lamort, A. M. El-Mishad, M. N. Nicolson, M. Pettigrew, and A. D. Shubsachs.

UNIVERSITY OF OXFORD.—On June 23rd the Chancellor of the University (Viscount Cave) presided at an Encænia at which honorary degrees were conferred. The Public Orator introduced the recipients, amongst whom were Lord Dawson of Penn and Sir Walter Morley Fletcher, with brief Latin speeches. After recalling the work done by Lord Dawson for the military hospitals during the war, he continued: "He has lately been called to the House of Lords and is the only member of the Guild of Æsculapius among the Peers. We, members of the University, know well how important it is to stop mischief at the beginning. We trust that by the help of a senator so wise, tactful, and learned, the population of our country, with a tonic of sound laws, may rise from the third grade of pygmies to the highest grade of athletes. I present to you one who applies sound learning to national health." Sir Walter Fletcher he described as "a researcher in natural science, who by most careful experiments discovered and expounded the chemical changes which take place when the muscles are contracted, grow weary, and are revived by nourishment. . . . He became secretary to the Council of Medical Research and is both a spirited adviser and a wise administrator.

UNIVERSITY OF LONDON.—At a meeting of the Senate held on June 23rd Sir William Beveridge, K.C.B., director of the London School of Economics, was elected Vice-Chancellor for 1926–27 in succession to Prof. E. A. Gardner.—Mr. P. A. Buxton was appointed as from August 1st to the University Readership in Medical Entomology tenable at the London School of Hygiene and Tropical Medicine. Mr. Buxton was a Fellow of Trinity College, Cambridge, from 1916 to 1921, and served during the war as entomologist to the Mesopotamian Force. From 1920 to 1921 he was demonstrator in the zoology department at Cambridge, and from 1921 to 1924 acted as medical entomologist to the Palestine Government; in 1924 he was leader of the expedition from the School of Tropical Medicine to the South Pacific. For the past few months he has been director of the department of medical entomology at the London School of Hygiene and Tropical Medicine.—The title of Reader in Pharmacognosy in the University was conferred on Mr. T. E. Wallis, F.I.C., in respect of the post held by

him at the School of Pharmacy.—The resignations of Prof. A. J. Clark from the University chair of Pharmacology tenable at University College, on appointment to the chair of Materia Medica in the University of Edinburgh, and Dr. G. V. Anrep from the University Readership in Physiology tenable at the same College, on appointment to a Lectureship in Physiology in the University of Cambridge, were accepted as from July 31st.—The Dunn Exhibition in Physiology was awarded to Mr. C. G. Paine, of St. Mary's Hospital Medical School, in the place of Mr. D. F. Ogborn, who was originally awarded the Exhibition and has since been drowned in a boating accident whilst saving the life of another.

Dr. Major Greenwood, F.R.C.P., has been appointed, as from August 1st, 1928, to the University Chair of Epidemiology and Vital Statistics tenable at the London School of Hygiene and Tropical Medicine. The title of Reader in Medical Statistics was conferred on him by the Senate in January, 1915, in respect of the post held by him at the Lister Institute of Preventive Medicine. From 1917–19 he served with the R.A.M.C., and in 1920 was appointed medical officer to the Ministry of Health. Dr. Greenwood was Milroy Lecturer at the Royal College of Physicians in 1922, and is honorary secretary of the Royal Statistical Society and of the Section of Epidemiology of the Royal Society of Medicine.

Prof. W. W. C. Topley, M.D., F.R.C.P., has been appointed as from August 1st, 1928, to the University Chair of Bacteriology and Immunology tenable at the London School of Hygiene and Tropical Medicine. During the war Prof. Topley acted as pathologist to the British Military Sanitary Commission in Serbia. From 1911–22 he was director of the Institute of Pathology at Charing Cross Hospital, since when he has been professor of bacteriology in the University of Manchester and director of the Public Health Laboratories. In 1919 he was Goulstonian Lecturer to the Royal College of Physicians, and in March, 1926, delivered the Milroy Lectures in Experimental Epidemiology at the College.

ROYAL MEDICO-PSYCHOLOGICAL ASSOCIATION.—The eighty-fifth annual meeting of this Association will be held from Monday, July 12th, to Friday, July 16th, at the British Medical Association House, 19B, Tavistock-square, London, W.C., under the presidency of Colonel R. J. Lord. The annual dinner of the Association will be held on Thursday, July 15th, at 7.15 for 7.30 P.M., at the Victoria Hotel, Northumberland-avenue, London, W.C., and on the following day a visit will be paid to Horton Mental Hospital, Epsom.

BIOCHEMICAL SOCIETY.—A joint meeting will be held with the London section of the Society of Chemical Industry on Tuesday, July 20th, at 11 A.M., in the Regent Room of the Hotel Great Central, Marylebone, London, W., when there will be a discussion on the Scientific and Industrial Problems presented by the Hormones—the Natural Drugs of the Body. Papers will be read by Dr. H. H. Dale, F.R.S., on the Experimental Study and Use of Hormones; by Dr. H. W. Dudley on the Chemistry of the Pituitary Gland and of Insulin; by Mr. F. H. Carr on the Commercial Production of Hormones; by Dr. H. A. D. Jowett on the History of Adrenalin; by Prof. G. Barger, F.R.S., on Recent Progress in the Chemistry of Thyroxine; and by Dr. J. W. Trevan on Biological Assay of Hormones. A general discussion will follow.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—On Monday, July 5th, at 2.30 P.M., Mr. Cairns Forsyth will give a clinical demonstration at the Royal Waterloo Hospital, and on Thursday, July 8th, at 3 P.M., Mr. MacCallan will give a demonstration in ophthalmology at the Royal Eye Hospital. Both of these will be open to the medical profession without fee. Beginning on July 19th there will be an intensive two weeks' vacation course at the North-East London Post-Graduate College (Prince of Wales's General Hospital, Tottenham), consisting of instruction in clinical and laboratory methods, demonstrations of groups of selected cases, general hospital work, and formal lectures. The West End Hospital for Nervous Diseases will hold a late afternoon course from July 19th to August 11th, comprising lectures and clinical demonstrations in the out-patient department, at 73, Welbeck-street, London, W. There will be a series of demonstrations on eye diseases by the members of the staff of the Royal Eye Hospital from July 12th to 24th, at 3 P.M. daily. Practical courses in obstetrics and child welfare are arranged to take place at the City of London Maternity Hospital; each course will last one week. Practical courses in anæsthetics can be arranged at any time to suit post-graduates' requirements. Copies of all syllabuses, of the General Course programme, and of the *Post-Graduate Medical Journal*, may be had on application to the secretary of the Fellowship at 1, Wimpole-street, London, W. 1.

WE regret to learn of the death of Mr. W. H. Clayton-Greene, recently surgeon to, and at one time Dean of the Medical School at, St. Mary's Hospital, Paddington.

ASSOCIATION OF SPECIAL LIBRARIES AND INFORMATION BUREAUX.—The third conference of this Association will be held at Balliol College, Oxford, from Sept. 24th–27th. With the assistance of the Carnegie United Kingdom Trust, the Association has undertaken the compilation of a directory of sources of specialised information in Great Britain and Ireland.

SOCIETY OF SUPERINTENDENTS OF TUBERCULOSIS INSTITUTIONS.—The next meeting of this society will be held at 122, Harley-street, London, W., on Monday, July 5th, at 3 P.M., when Dr. S. Roodhouse Gloyne will open a round-table discussion on a Few of the Unsolved Pathological Problems associated with Tuberculosis, and Dr. F. R. G. Heaf will give a paper on Sedimentation Tests.

OXFORD OPHTHALMOLOGICAL CONGRESS.—The seventeenth annual meeting of the Oxford Ophthalmological Congress will be held from Thursday, July 15th, to Saturday, July 17th, at Oxford. The annual dinner of the Congress will take place at Keble College on July 15th and members of the Congress may be accommodated in the College. The Doyne Memorial Lecture will be delivered on the following day by Dr. Thomas Henderson, of Nottingham, whose subject will be the Anatomy and Physiology of Accommodation in Mammalia. During the Congress there will be an exhibition of ophthalmological instruments and apparatus in the Department of Human Anatomy of the University Museum. Further particulars of the Congress may be had from the hon. secretary, Mr. A. Bernard Cridland, Salisbury House, Chapel Ash, Wolverhampton.

THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS OF ENGLAND.—The new specimens which have been added during the past twelvemonth will be on view in Room I. of the museum until July 17th.

Pathological Series.—A localised dilatation of the upper part of the ureter of a child, of the size of a goose's egg, resulting from injury to the loin, and developing in the course of six weeks from the time of the accident; an invagination of the wall of the lower end of the ileum, resulting from the presence of a submucous lipoma, with prolapse of the invagination into the cæcum producing an appearance closely simulating an ileo-cæcal intussusception; a successful transplantation of the flexor tendons of the forearm on to those of the extensor muscles in a case of severance of the musculo-spiral nerve from gunshot injury; an angioma of the parietal bone removed by operation; a series of tumours removed by operation from within the chest, including a mediastinal teratoma, a dermoid cyst, a lipo-sarcoma of the pleura, a malignant endothelioma of the pleura, a chondro-sarcoma of a rib and a large mediastinal cyst of obscure origin, containing cholesterin; a small papillary myxoma of a semilunar flap of the aortic valve which caused death by becoming impacted in the orifice of one of the coronary arteries; a central myxoma of the upper end of the femur simulating clinically cystic disease of the bone; several gall-stones removed by litholapaxy from the urinary bladder.

Teratological Specimens.—The heart of a new-born child with complete obliteration of the aortic orifice, the left ventricle communicating with the aorta by means of a very large descending branch of the anterior coronary artery which opens into the cavity of the ventricle at the apex of the heart; a similar malformation in the heart of an ox, except that the aortic orifice is freely open; dilatation of the upper half of the œsophagus of a dog, due to a stenosis caused by compression of the tube between a right aortic arch and the ligamentum arteriosum.

Physiological Department.—A number of specimens have been added to complete the series illustrating the comparative anatomy of the ductless glands, among them being a preparation showing the lymph sacs which envelop the thyroid gland in the tortoise. Two additions of special interest have been made in the Department of Human Osteology—namely, replicas of the Galilee skull and the London or Lloyd's skull. The original of the former belongs to the Government of Palestine; it was excavated near the Sea of Galilee and is the first skull of the Neanderthal type that has been discovered outside the confines of Europe. The last-named skull was excavated a few months ago in the City of London. It is considered to be the oldest relic of the human body that has been discovered in the valley of the Thames. An interesting specimen, a gift of the President, is a fine example of the Mexican ligature ant. The natives avail themselves of the powerful mandibles of this insect in suturing wounds.

THE Secretary of State for the Colonies has appointed Dr. A. T. Stanton to be his chief medical adviser, taking up his duties in August next. Since 1921 Dr. Stanton has held the post of Director of Government Laboratories in the Federated Malay States.

RATES ON HOSPITALS.—The recent revaluation of property at Newcastle-upon-Tyne has resulted in heavy increases in the assessments of the hospitals. The old assessment of the Royal Infirmary was between £120 and £130; it has now been increased about twenty-fold. The assessment of the Eye Infirmary has been increased from £17 to £290.

VENERABLE ORDER OF THE HOSPITAL OF ST. JOHN OF JERUSALEM.—The King has sanctioned the following promotions in and appointments to the Venerable Order of the Hospital of St. John of Jerusalem: *As Knights of Grace:* Captain Charles Arthur Coventon, R.A.M.C. (T.A.), Dr. Henry Howorth Bashford, and Lieut.-Colonel John Calderwood Strathearn. *As Esquires:* Dr. Meredith Young, Dr. William Richard Bates, Major Rupert Briercliffe, Major James Abbey Henderson, R.A.M.C. (T.F.), Dr. Robert Ashleigh Glegg, Colonel James John Pratt, and Major James Smith Mather, R.A.M.C. (T.).

ST. THOMAS'S CORNWALL BABIES' HOSTEL.—This dietetic hostel, situated in the midst of the St. Thomas's Hospital maternity district, has been open in its present form only 18 months, but the annual report shows that it is doing excellent work. In addition to saving the lives of babies suffering from gastro-intestinal disturbance, teaching mothers the proper care of their infants, and testing breast-feeding, the hostel is of value as a training centre. The medical officer, Dr. K. J. Hamilton, points out that the comparatively small number of babies enables the student to study each case in detail.

THE LATE DR. R. J. COLENSO.—Dr. Robert John Colenso, who died on June 2nd, was a noted figure amongst the practitioners of South Kensington, where he had worked for 35 years. Born in Norfolk in 1850, he was the son of the Rt. Rev. J. W. Colenso, formerly Bishop of Natal, and was educated in Kensington and at Oxford University. After medical study at St. Bartholomew's Hospital he became M.R.C.S. in 1878 and proceeded to the M.D. degree at Oxford in 1899. For a time he served as resident medical officer of the Windsor Royal Infirmary, but on being gazetted surgeon to the Natal Royal Rifles, went out to South Africa where he engaged in practice and became proficient in the Zulu language. On his return to England he showed great interest in anatomy and published a number of valuable papers on the subject. He also contributed to medical journals and wrote natural history sketches on South African animals, which showed his love of sport and the open air. He was a skilful angler and a good shot, and keenly advocated the outdoor life which had made him robust and alert. His presence and help will be missed by many.

LONDON (R.F.H.) SCHOOL OF MEDICINE FOR WOMEN.—The presentation of prizes and certificates was made by Sir John Ferguson at the London School of Medicine for Women on June 25th, when Lady Barrett presided over a meeting of supporters, including Lord Riddell, president of the hospital, Dr. Scharlieb, Mr. J. A. Gardner, Miss Angus, and Mr. Willmott Evans. In opening the proceedings, Lady Barrett referred to the great loss which the school had sustained by the death of its late dean, Dame Louisa Aldrich-Blake. The working year had been a most successful one, and of the 25 distinctions granted to hospital schools by the University of London eight have been won by the London School of Medicine for Women. It was said that the Battle of Waterloo was won on the playing fields of Eton, but Lady Barrett was quite sure that the battle of health with disease was also won on playing fields, and she congratulated the school on having acquired a sports grounds of 6½ acres. This was in process of development and towards the cost the Council had given £3000, while the students and their friends had contributed more than £2000, but £1100 was still required. Other features of the year, she added, were the progress of the children's ward, the opening up of a light treatment department, and the extension of the maternity department, due in great measure to the munificence of Lord Riddell. The principal prize-winners were: The Dean's Medal for Skill in Clinical Medicine: K. M. Bowman-Manifold. Gant Medal in Surgery and the Richardson-Kuhlmann Prize in Senior Subjects: E. Clarke. Richardson-Kuhlmann Prize in Obstetrics: E. Clarke and F. D. Fox (divided). Dorothy Chick Gift: M. Low. Directors' Medal in Gynæcology, presented by Prof. A. L. McIlroy: J. Hoare.

GUY'S HOSPITAL.—On Thursday, July 8th, at 3 P.M., Mr. F. D. Acland, chairman of the Dental Board of the United Kingdom, will open the extension of the Dental School.

CHELSEA HOSPITAL FOR WOMEN.—The convalescent home at St. Leonards belonging to this hospital is about to be reopened after extensive alteration and improvements. Much sanitary work was needed, and among other additions four more beds have been provided and the domestic accommodation considerably enlarged.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.—The annual meeting of the Maternity and Child Welfare Group will be held at Caxton Hall, Westminster, on Tuesday, July 6th, at 5.30 P.M., when Mr. George Waugh will open a discussion on Tonsils and Adenoids. Amongst other speakers will be Dr. R. C. Clarke and Dr. Harold Waller, and the meeting will be open to members of the medical profession. After the meeting, at 7.30 P.M., there will be a dinner at the Florence Restaurant, Rupert-street, W. Particulars may be had from the hon. secretary, Dr. M. Emslie, 1, Upper Montague-street, London, W.C. 1.

WIGAN INFIRMARY.—The board of management in its annual report states that last year, despite the industrial depression, the miners and the workers in the various industries in the Wigan mining area by means of their scheme of systematic weekly hospital contributions raised £16,544 towards the maintenance of the infirmary, a decrease of only £791 in the previous year's record. The deficit was partly compensated for by the bequest of £10,000 by the late Miss Ann Dawber, of Wigan and Parbold, the interest on which will help to make up for the diminished weekly contributions.

THE LATE DR. A. G. R. CAMERON.—Dr. Allan Gordon Russell Cameron, who died at Worthing on June 19th at the age of 58, was the son of Mr. D. C. Cameron, of Wakenaam, British Guiana. He studied at University College and at St. Mary's Hospital, London, and qualified in 1891, graduating in medicine at Durham a year later. After holding an appointment in Wales he was for a time medical officer to the Metropolitan Asylums Board, after which he went to India, where he received the thanks of the Government for his work in connexion with plague. In 1905 Dr. Cameron was appointed county medical officer to the West Sussex County Council and settled in Worthing. He was an energetic worker and did a great deal for his large area. In 1913 he went to Durham as deputy medical officer for the county, and there remained for ten years. For the last few years he had been living at Worthing.

INSTITUTE OF HYGIENE.—A reception was held by Sir Thomas Carey Evans at the Institute on June 29th to meet Dr. Charles James Hastings, medical officer of health for Toronto. Dr. Hastings, who is past-president of both the American and Canadian Public Health Associations, gave an address in which he said that the first duty of a statesman is the care of the public health. This must begin, he said, where eugenics leaves off—namely, with the germ plasm—and it must not be forgotten that the infant is nine months old when it is born. After antenatal care the next link in the chain is the care of the new-born child; then of the pre-school child; then there must be medical examination of every child on entering school, medical, dental, and nursing care of every child at school, and a further examination of every child on leaving school. It was regrettable that so many health departments had so long neglected those engaged in industry. Dr. Hastings went on to describe the reforms which had been made in Toronto, and discussed infected milk as a danger to children and others. Municipalities which do not efficiently safeguard water- and milk-supplies are, he considers, guilty of criminal negligence.

THE LATE DR. S. G. MOSTYN.—We regret to learn that Dr. Sydney Gwenffrwd Mostyn was killed in a motoring accident on June 21st whilst on holiday in Scotland. He was 59 years of age and had been medical officer of health for Darlington since 1911. He received his medical education at St. Bartholomew's Hospital, and from the time of his qualification in 1902 devoted himself to public health work. As assistant in the County Health Department of the West Riding he gained wide practical experience, and for a time he was responsible for the Public Health Laboratory. He became familiar with hospital administration whilst resident medical officer of the Newcastle Infectious Diseases Hospital, and on appointment as medical officer of health for South Shields brought to his work a sound knowledge of his profession, which bore fruit both there and in Darlington. Dr. Mostyn was a graduate in arts and medicine of the University of Oxford. He leaves a widow.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL INSTITUTION, 21, Albemarle-street, W.
MONDAY, July 5th.—5 P.M., General Meeting of the Members.

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASE, 11, Chandos-street, Cavendish-square, W.
FRIDAY, July 9th.—8.30 P.M., Fifth Annual General Meeting.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.
MONDAY, July 5th, to SATURDAY, July 10th.—Special demonstration in clinical surgery by Mr. Cairns Forsyth at the Royal Waterloo Hospital on Monday at 2.30 P.M. Special demonstration in clinical ophthalmology by Mr. MacCallan on Thursday at 3 P.M. at the Royal Eye Hospital. These demonstrations are open to all members of the medical profession, without fee.—HOSPITAL FOR DISEASES OF THE SKIN, Blackfriars, S.E. Afternoon course in Dermatology consisting of instruction in the Out-Patient Department. Tuesday, selected cases by Mr. Haldin-Davis.

NORTH-EAST LONDON POST-GRADUATE COLLEGE, Prince of Wales's General Hospital, Tottenham, N.
MONDAY, July 5th.—10 A.M., Surgical Out-patients: Mr. W. E. Tanner. 10.30 A.M., Gynæcological Operations: Mr. A. E. Giles: Throat, Nose and Ear Operations: Mr. W. Ibbotson. 2 P.M., Medical, Surgical, and Gynæcological Clinics, Operations. 6.30 P.M., Venereal Department: Mr. R. Coyte.
TUESDAY.—2 P.M., Medical, Surgical, Throat, Nose and Ear Clinics, Operations. 3 P.M., Dr. J. K. C. Laing: Demonstration of cases illustrating Types of Mental Disease at the Colney Hatch Mental Hospital, New Southgate, N.
WEDNESDAY.—10.30 A.M., Surgical Operations: Mr. E. Gillespie. 2 P.M., Medical, Eye, and Skin Clinics, Operations. 3 P.M., Mr. T. H. C. Benians: Pathological Demonstration of Tumours of the Breast. 5.30 P.M., Venereal Department.
THURSDAY.—10.30 A.M., Dental Out-patients: Mr. E. S. Pierrepont. 2 P.M., Medical, Surgical, and Throat, Nose and Ear Clinics, Operations. 5 P.M., Operations.
FRIDAY.—10.30 A.M., Eye Operations: Mr. N. Fleming. 2 P.M., Surgical, Medical, and Children Clinics, Operations. 3 P.M., Gynæcological Clinic. 6.30 P.M., Venereal Department: Dr. F. L. Provis.

CENTRAL LONDON THROAT, NOSE AND EAR HOSPITAL, Gray's Inn-road, W.C.
FRIDAY, July 9th.—3 P.M., Mr. Watkyn-Thomas: Indications for the Radical Mastoid Operation.

CANCER HOSPITAL, Fulham-road, S.W.
FRIDAY, July 9th.—4.30 P.M., Sir Thomas Horder: The Cachexia of Malignant Disease and its Treatment.

LONDON SCHOOL OF DERMATOLOGY, 49, Leicester-square, W.C.
TUESDAY, July 6th.—5 P.M., Dr. Haldin-Davis: Drug Eruptions.
THURSDAY.—5 P.M., Dr. J. T. Ingram: Pathological Demonstration.

Appointments.

BENSON, ELIZABETH E., M.B., Ch.B. Brist., has been appointed Medical Officer to the Gloucester Board of Guardians.
COMBER, VIOLET, M.B. Lond., Resident Medical Officer at Willesden Municipal Hospital.
DOWLING, EILEEN, M.B., Ch.B. Liverp., in charge of the Maternity and Child Welfare work at West Ham.
HEARN, L. W., M.B., B.S. Durh., Resident Medical Officer, Hull Sanatorium.
LEWIS, GRAHAM, M.S. Lond., F.R.C.S. Eng., a Consulting Gynæcologist to the Birmingham General Dispensary and also Honorary Consulting Gynæcologist to the West Bromwich and District Hospital.
Tranmere Infirmary: JOHNSON, W., M.D. Liverp., Visiting Physician: HATTON, J., and ROBERTS, J. T. C., Junior Resident Assistant Medical Officers.
Certifying Surgeons under the Factory and Workshop Acts: HALL, J. S., M.B., Ch.B. Glasg. (Rothesay); LIGERTWOOD, C. E., M.B., Ch.B. Manch. (Wiveliscombe).

Vacancies.

For further information refer to the advertisement columns.

Bedford County Hospital.—Asst. H.S. £130.
Birmingham University.—Walter Myers Travelling Studentship. £300.
Brighton, Royal Sussex County Hospital.—H.S. £150.
Bristol, City and County of.—Asst. Tuberculosis O. £600.
Bristol Royal Infirmary.—Surg. Reg.
Cape of Good Hope.—M.O.H. £1100.
Colchester, Essex County Hospital.—Asst. H.S. and Reg. £150.
Durham County Council.—Asst. Welfare M.O. £600.
Halifax Royal Infirmary.—First H.S. At rate of £250.
Hastings Union, &c.—R.M.O. At rate of £650.
Hospital for Consumption and Diseases of the Chest, Brompton, S.W.—Res. M.O. £600. Also H.P. £50 for six months.
Ipswich County Borough.—Asst. M.O.H., &c. £600.
London Hospital, E.—Gynæcological Surg.
London Lock Hospital, 283, Harrow-road, W.—Second H.S. £150.
Manchester, Ancoats Hospital.—R.M.O. Also H.P. At rate of £150 and £100 respectively.
Manchester University.—Lecturer in Experimental Physiology.
Metropolitan Asylums Board, Infectious Hospitals Service.—Med. Supt. £900.
Mildmay Mission Hospital, Austin-street, Bethnal Green, E.—Hon. Emergency S.
Mount Vernon Hospital, Northwood, Middlesex.—Res. M.O. At rate of £300.
Rochester, St. Bartholomew's Hospital.—Hon. Pathologist.
Rotherham Hospital.—Jun. H.S. £150.
Scarborough Hospital and Dispensary.—Two H.S.'s. At rate of £126.
Stockport Infirmary.—Res. H.P. £175.
Talgarth, Breconshire, South Wales Sanatorium.—Asst. Res. M.O. £200.
Ventnor, Isle of Wight, Royal National Hospital for Consumption, &c.—Jun. Res. M.O. At rate of £360.
Victoria Hospital for Children, Tite-street, Chelsea, S.W.—H.P. and H.S. Each at rate of £100.
Walthamstow, Wanstead, and Leyton Children's General Hospital.—Res. H.S. £100.
West London Hospital, Hammersmith-road, W.—Res. Asst. S. £200.
Willesden General Hospital, Harlesden-road, N.W.—Cas. O.

Births, Marriages, and Deaths.

BIRTHS.

ANDERSON.—On June 21st, at "Seacroft," Gorleston, the wife of Dr. A. S. K. Anderson, D.S.O., M.C., of twin sons.
GARRATT.—On June 26th, at Myrtle House, Dunstable-road, Luton, Beds, the wife of Frank Garratt, M.R.C.S., L.R.C.P., of a son.
STANLEY.—On June 22nd, at rue des Belles Feuilles, Paris, the wife of E. Gerald Stanley, M.D., M.S., F.R.C.S., of a daughter.
WILSON.—On June 22nd, at Birmingham, Gwen, the wife of R. K. Wilson, F.R.C.S. Edin., of a son.

MARRIAGES.

BUCKLEY—KING.—On June 23rd, at St. Andrew's Church, Ashley-place, Captain Charles Dudley Maybury Buckley, M.C., R.A.M.C., and Shelagh Patricia, daughter of the late James Claude King and Mrs. Claude King, and niece of Colonel C. W. Mainprise, D.S.O., A.M.S.
CUTLER—HUSSEY-WALSH.—On June 24th, at St. Mary's, Cadogan-gardens, Lennard Cutler, M.R.C.S., L.R.C.P., to Maud Marie, only daughter of the late Colonel William Hussey-Walsh, Royal Welch Fusiliers, and Mrs. Hussey-Walsh, Ennismore-gardens, S.W.
LUPTON—TUCKEY.—On June 22nd, in Ripon Cathedral, Charles Athelstane Lupton, M.C., F.R.C.S., to Esther Isabel, only daughter of Canon and Mrs. Tuckey, of Littlethorpe Manor, Ripon.
MURRAY BLIGH—UNDERWOOD.—On June 24th, at St. Francis Xavier's Church, Liverpool, John Murray Bligh, M.D., M.R.C.P., of 74, Rodney-street, Liverpool, to Emily Elizabeth Underwood.
PANTON—HEATH.—On June 24th, at St. Mary's Church, Ashton-on-Mersey, by the Rev. R. Main, assisted by the Rev. D. E. Sturt, John Allison Panton, M.D., Ch.M., F.R.C.S. Eng. and Edin., only son of the late Dr. J. E. Panton, and Mrs. W. A. Bridson, of Bolton, to Kathleen Amy, only daughter of Mr. and Mrs. Robert Heath, of Vernon Lodge, Brooklands, Cheshire.

DEATHS.

CAMERON.—On June 20th, suddenly, at "Dawnie," Ariadne-road, Worthing, Allan Gordon Russell Cameron, M.B., D.P.H.
CLARKE.—On June 22nd, in Paris, Robert Henry Clarke, M.B., M.R.C.S., of Duppas Hill-road, Croydon, aged 73.
CROUCH.—On June 25th, at Harley-place, Clifton, Bristol, Charles Percival Crouch, F.R.C.S., aged 65.
CROWTHER, John Woodwood, M.R.C.S., L.S.A., late Hon. Consulting Surgeon to West Bromwich and District Hospital, on June 11th, at his residence, Marloes, Russell-road, Lee-on-Solent.
INKSTER.—On June 23rd, at Bourton Hall, Totnes, and formerly of Broomhill Lodge, Sheffield, Samuel Macaulay Inkster, M.D., C.M. Edin., aged 77.
LANE.—On June 21st, at Carlton-avenue, Kenton, Harrow, Frederick Herbert Lane, M.R.C.S., late of Brixton Hill, S.W., and Burford, Oxon.
MACLAY.—At Bamburgh, suddenly, on June 26th, Neil Maclay, M.B., C.M., of 2, Fenham-terrace, Newcastle-on-Tyne, aged 53 years, dearly beloved husband of Mary Maclay.
PISANI.—On June 22nd, in London, Lieut.-Colonel Lionel John Pisani, F.R.C.S., I.M.S., retd., aged 64.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Notes, Comments, and Abstracts.

THE HEALTH, PENSIONS, AND UNEMPLOYMENT ACTS:

DOCTORS AND DENTISTS AS EMPLOYERS.

THE Widows', Orphans', and Old Age Contributory Pensions Act, 1925, which came into operation on Jan. 4th, 1926, applies to all persons who are subject to compulsory health insurance; combined health insurance and pension contributions are, therefore, payable for all such persons in the service of medical and dental practitioners. As there appears to be a certain amount of misapprehension about the liability of the practitioner as employer, under the National Health Insurance, Contributory Pensions, and Unemployment Insurance Acts, the Ministry of Health has issued a statement explaining the position.

Health and Pensions Insurance.

In general, insurance under the National Health Insurance and Contributory Pensions Acts is compulsory for every person who is employed under a contract of service, if the employment is remunerated at a rate not exceeding in value £250 a year, or, where the employment is by way of manual labour, irrespective of the rate of remuneration. A person employed as an apprentice or pupil is similarly required to be insured if he receives wages or other money payment (whether in the form of the return of apprenticeship premium or otherwise) in respect of his services. Thus, among insurable employees may be included nurses, dental mechanics and apprentices, secretaries, reception clerks, domestic servants, hall porters, and chauffeurs.

In arriving at the rate of remuneration of persons not manually employed, account should be taken of the value to the employee (e.g., a resident secretary or nurse) of any emoluments in kind such as board and lodging provided at the employer's expense. In the case of part-time employment the equivalent remuneration for normal full-time employment should be taken.

The question whether an employment is or is not by way of manual labour arises not infrequently in the case of dental mechanics and chauffeurs, where the rate of remuneration is in excess of £250 a year. A dental mechanic employed solely in a dental workroom in making artificial teeth, crowns, &c., is regarded as employed by way of manual labour. A dentist's assistant, however, who is engaged mainly in the ordinary duties of a qualified dentist (such as attendance on patients and dental surgery), or whose main duties consist of the supervision of other employees, is regarded as employed otherwise than by way of manual labour. In cases where an assistant may be engaged partly in the mechanical work of making artificial teeth, and partly in non-manual duties as mentioned above, regard must be paid to the main and substantial nature of his duties. In any case of doubt, whether employment is or is not by way of manual labour, it is desirable that reference should be made to the Ministry of Health for a ruling.

A chauffeur who is required to clean a car and to effect running repairs, in addition to driving, is normally regarded as employed by way of manual labour, and is, therefore, compulsorily insurable irrespective of the rate of his remuneration.

Unemployment Insurance.

Except as stated below, contributions under the Unemployment Insurance Acts have to be paid in respect of any person whose employment falls within the scope of compulsory health and pensions insurance. As regards persons employed by members of the professions, there are three main classes in which liability to unemployment insurance does not coincide with liability to insurance under the Health Insurance and Pensions Acts—viz., employment as a female professional nurse for the sick; employment in domestic service; and employment in agriculture, including horticulture.

Female nurses have been excepted from unemployment insurance since July, 1922, but this exception does not extend to dispensers, secretaries, or persons employed by doctors or dentists merely to receive patients, make appointments, and answer telephone messages, even though such persons may have undergone training as professional nurses.

Employment in domestic service is excepted from liability to insurance only where the employed person is not employed in a trade or business carried on for the purposes of gain. It has been held by Mr. Justice Roche in the High Court that a doctor is carrying on a business for the purpose of gain within the meaning of the Act, and domestic servants employed in that business are, therefore, required to be insured. The judge decided that a chauffeur employed primarily to drive a doctor on his rounds, and a domestic servant employed by a doctor in a nursing home carried on by him in addition to his practice, were employed in the business of their respective employers. These decisions are held to cover in principle chauffeurs employed to drive or accompany doctors on their rounds; servants employed to attend upon the patients or staff in a nursing home; and servants employed at the surgeries of doctors or dentists to admit patients, make appointments, or do other work in connexion with the employer's professional requirements.

Servants employed in doctors' or dentists' private residences solely in connexion with their employer's personal needs, and servants whose duties in connexion with their employers' business are confined to cleaning the surgery and admitting occasional patients, are not regarded as employed in the business, and are not, therefore, required to be insured against unemployment.

Employment in agriculture which concerns gardeners, whether regular or jobbing, is totally excepted from unemployment insurance.

MEDICAL WOMEN'S FEDERATION.

THE annual general meeting was held on June 17th, under the chairmanship of Miss Frances Ivens, the retiring President. It was agreed that the sum of £100 from the accumulated balance of the Federation be given to the Dame Louisa Aldrich-Blake Memorial Fund, and be definitely earmarked as a contribution to the proposed Scholarship Fund. The business meetings of the Council took place at the London School of Medicine for Women. The first business was the election of the officers. Dr. Christine M. Murrell was elected President, Dr. Ellen B. Orr and Dr. Clara Stewart Vice-Presidents, and Dr. Jane Walker, J.P., honorary treasurer. These, together with Miss Frances Ivens, past-President, Lady Berry, honorary secretary, and Miss Mabel Ramsay elected from the Council, compose the Executive Committee for the coming year. Reports of the various standing committees and sub-committees of the Federation were received and discussed. The report of the Aviation Subcommittee evoked much interest. The subcommittee, which consisted of members representing medicine, surgery, physiology, neurology, and gynæcology, recorded the opinion that the various qualities which produce the "flying aptitude" are found in women as well as men. They specially considered the question of menstruation and pregnancy in relation to women's fitness for flying and for receiving aviation certificates. In this connexion they examined the results of recent research into the effect of menstruation on the various processes of the body, especially researches carried on at the London School of Medicine for Women under the direction of Prof. W. Cullis, which showed that there was no change during menstruation in basal metabolism, pulse-rate, or blood pressure, also that the cost to the organism of a certain amount of work, and the recovery rate from work, was the same both during menstruation and the inter-menstrual time. They arrived at the conclusion that normal menstruation was no bar to flying, and considered that the searching and repeated medical examinations already in force in regard to those holding certificates would be sufficient to prevent persons in an unfit condition from undertaking flights. It was reported to the meeting that the International Commission on Air Navigation at its meeting in Paris had agreed to the principle that women should be eligible for the Pilot's B. Certificate, but had referred to their Medical Sub-Commission the question of modifications in the medical examination requirements necessary to make them applicable to women. The National Corresponding Secretary of the Medical Women's International Association reported that the medical women of Canada, and still more recently those of Mexico, had formed associations which had joined the International Association. A new standing committee on public health was formed to watch public health developments, including posts advertised. On the evening of June 18th a conversazione was held by the London Association of the Federation in the British Medical Association House. Sir James and Lady Berry each gave a short lecture to a large and appreciative audience.

ANTHRAX FROM SHAVING-BRUSHES.

ONLY one case of anthrax from shaving-brushes has occurred since the beginning of this year, happily without fatal result. The Minister of Health stated, in answer to a question in the House of Commons by Mr. J. B. Couper, that all practicable steps have been taken to trace shaving-brushes which have been imported into this country from the same source, with a view to their being destroyed or withheld from sale. Steps have also been taken to deal with any future consignments of shaving-brushes from this source, and the matter has been referred to the Government of the country of origin in order that appropriate action may be taken.